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A REVIEW OF SOME RECENT RUSSIAN PUBLICATIONS ON THE TECHNIQUE OF AGE DETERMINATION IN ANOPHELES

by

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The earlier work of Russian authors on methods for determining the physiological age of mosquitoes is well known. One may cite as examples the papers by Polovodova (1941) and Detinova (1945), whose results, in the form of abstracts, have been made available to English readers. But in the years immediately following the Second World War difficulties arose in obtaining certain scientific periodicals from Russia, among them the important journal *Meditsinskaya Parazitologia i Parazitarniye Bolyezni* [*Medical Parasitology and Parasitic Diseases*]. When this journal became freely available again, in 1953, it was apparent that considerable progress had been made in the development of a technique for the accurate determination of the age of female *Anopheles*. Details of the technique, however, were not given. Indeed in most cases the original sources were not even cited, a simple reference to " Polovodova's method " evidently being sufficient description for those acquainted with the literature. It has now been possible to obtain access to some of the earlier articles in which the technique is described and discussed, and in this short review an account is given of the method employed and of its application by entomologists in Russia to the study of populations of *Anopheles maculipennis* (*sensu lato*). The review is mainly limited to papers appearing in nos. 4 and 5 of vol. 18 (1949) of *Meditsinskaya Parazitologia* and to volumes of the same journal covering the years 1953 up to the middle of 1957.

Polovodova's method

From the time when MER (1932) first described the changes in the diameter of the ampullae of the oviducts after ovulation, attention has been focussed on the genital tract of female *Anopheles* in the search for characters that might lead to more accurate means of determining their age. Polovodova's earlier work (1941) described the qualitative changes in the oviducts and ampullae, which enabled the distinguishing of parous from nulliparous females without measurement. An alternative technique, based on changes in the tracheoles of the ovaries, was described by Detinova (1945). In a later paper Detinova (1946) used the technique to distinguish the summer generation of *A. maculipennis* from those that had overwintered. In 1942 KUZINA reported the presence of yellow bodies in the ovarioles of parous *Stomoxys*, these having their origin in

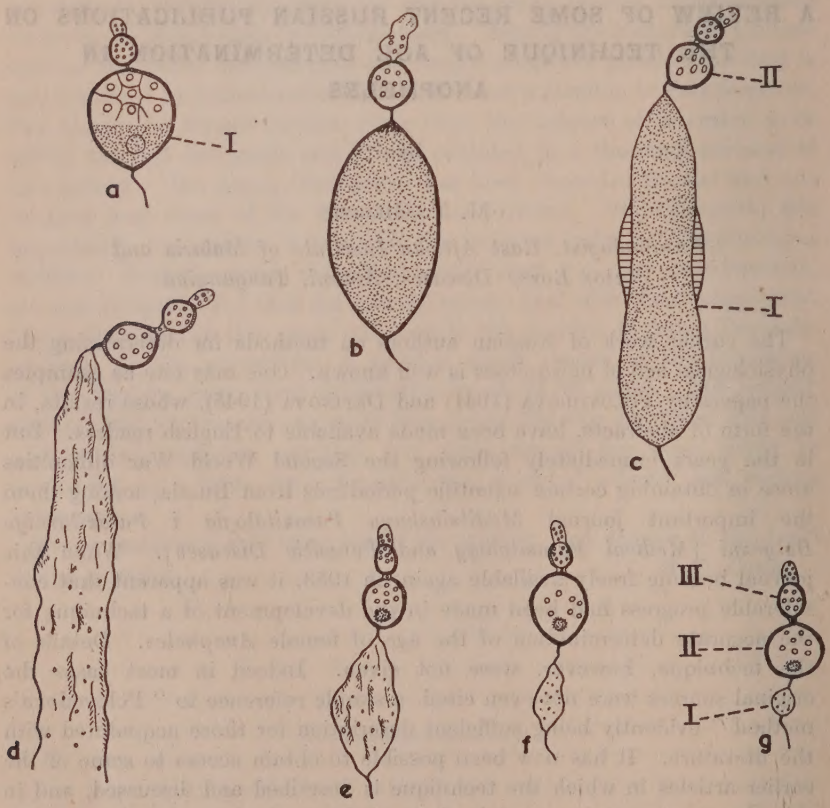

Fig. 1.—Showing successive stages in a single ovariole during the first gonotrophic cycle. (From Detinova, 1949.)

a–c) Development of the first follicle (I).
d) Immediately after ovulation.
e–f) During contraction of sac.
g) Final condition, showing pigmented thickening marking site of development of follicle I, follicle II about to develop, and follicle III as yet incompletely differentiated.

the remnants of the nurse cells left behind at the site of development of the previous follicle. Beklemishev (1944) described similar bodies in *A. maculipennis*, and Yaguzhinskaya (1945) used their presence to distinguish parous from nulliparous *A. superpictus* and *A. sacharovi*. Detinova (1946) also recorded the development of yellow pigment in the region of the internal oviduct of the ovaries of old females.

It fell to Polovodova (1947, 1949) to demonstrate that the yellow bodies were laid down in a definite pattern, that each one represented the site of development of an earlier follicle, and that the number of pigmented thickenings in an ovariole represented the total of eggs previously developed in it, and hence could be used as a guide to the number of egg batches previously laid. She showed, in fact, that they provided a reliable record of the reproductive history of each mosquito. In a female that has laid eggs once (see fig. 1), a single thickening can be distinguished between the currently developing follicle and the " terminal stalk " of the ovariole where it is fused with the internal oviduct. In females that have laid twice (see fig. 2 *c*), two thickenings can be distinguished, and so on up to the point where, in very old females, the proximal end of the ovariole, containing the developing follicle, is joined to the internal oviduct by a long chain of discrete pigmented thickenings. The effect has been likened by Lineva (1953) to beads on a rosary. Estimation of the physiological age of the mosquito is effected by a simple count of the highest number of thickenings seen in any one ovariole. A number of ovarioles need to be examined since, during each gonotrophic cycle, oögenesis may not necessarily take place in every ovariole, and in some the record of the activity of the ovary as a whole may be incomplete.

Polovodova's work was critically examined and extended by Detinova (1949), and the following more detailed account is mainly taken from the latter author. Illustrations of the technique, and of earlier methods, are also given in the handbook by Sergiev and Yakusheva (1956).

Technique of dissection

Dissection is carried out in physiological saline and the ovaries are examined under a binocular microscope. With the left hand the ovary is held down by a needle placed in the region of the internal oviduct (or lumen of the ovary), while with a needle held in the other hand the intimal sheath of the ovary is torn away in sections. This enables recognition of the individual ovarioles. These are then separated and drawn away from the internal oviduct so as to reveal the full extent of each ovariole. It is recommended that 15–20 ovarioles should be examined and the maximum number of thickenings in any one ovariole is recorded. Examination of the ovaries is easiest when the follicles are at an early stage of development, Christophers stage II or III, since in those with more fully developed " eggs " (more exactly, oöcytes) it may be impossible to examine the ovarioles without tearing them.

The changes seen in the ovarioles during the course of successive gonotrophic cycles are illustrated in figs. 1 and 2. At the beginning of the first cycle of oögenesis the following parts can be distinguished: a mass of germinal epithelium, an incompletely differentiated follicle, a well-defined follicle about to undergo development, and a terminal stalk connecting this follicle with the internal oviduct and representing the terminal part of the ovariolar tube. In the course of development of the follicle the ovariole becomes greatly elongated, and immediately after discharge of the mature egg the distal part of the ovariolar tube takes

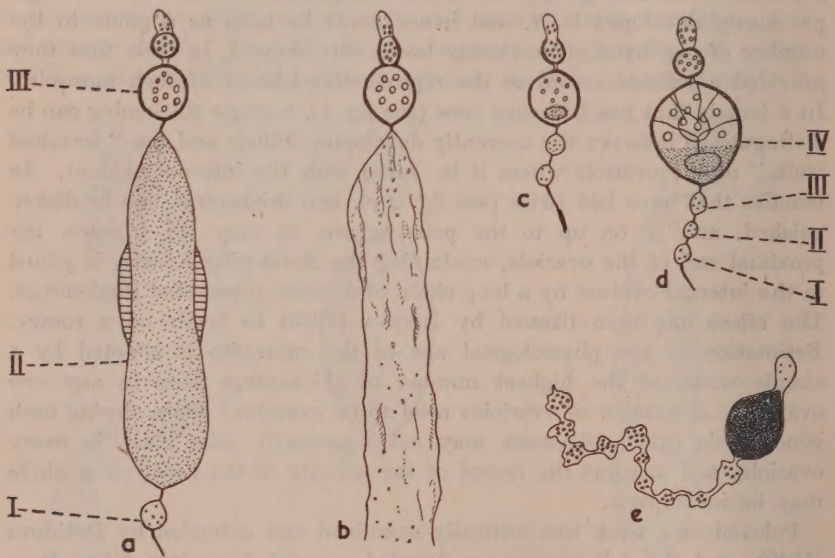

Fig. 2.—Ovariolar changes during the second and later cycles.
(*a–d* from Detinova, 1949; *e* from Polovodova, 1949.)

a) On maturation of follicle II.
b) Immediately after second ovulation.
c) Condition at end of second cycle.
d) Condition at end of third cycle, showing pigmented thickenings left behind by follicles I–III, and follicle IV about to develop.
e) Ovariole with degenerating follicle in a female that has previously completed ten gonotrophic cycles.

the form of a dilated sac (fig. 1 *d*). During the next 48 hours (Detinova, 1953*a*) the sac contracts down until all that remains is a short length of connective tissue enclosing a small mass of refractile granules of pigment marking the site of the first follicle. Meanwhile the next follicle is developing, as shown in fig. 2 *a*, and after ovulation the ovariolar tube again becomes sac-like. During this phase it will be noted that the pigmented thickening left behind by follicle I ceases to be visible, but on contraction of the sac it reappears together with the thickening left behind by follicle II. It is also apparent that, in addition to the accumulation of pigment, that portion of the ovariolar tube lying between

the currently developing follicle and the terminal stalk lengthens progressively. The deposition of discrete thickenings appears, in *A. maculipennis* at least, to continue progressively, and Detinova (1953*b*) was able to recognize individuals that had ovulated 12 times before capture. The same author also reported finding specimens thought to be even older than this.

Detinova (1949) has given further consideration to the question of the failure of some of the ovarioles to develop. Evidence is produced of a progressive increase with age in the number of inactive ovarioles. This increase is, however, by no means constant, and the fact that, in occasional instances, a larger total of eggs is laid in later batches shows that an ovariole which fails to develop in one cycle may nevertheless become active again later. Similarly, degeneration of developing follicles occurs with increasing frequency with age. The site of a follicle that has just degenerated is marked by a heavy deposit of pigment. If the next follicle above it subsequently develops and ovulation is completed, then, after contraction of the resulting sac, normal pigmented thickenings are found in the sites previously occupied both by the normal follicle and by the one that degenerated. Thus a true picture of the past history of the ovariole can be built up regardless of whether full development or partial development, with subsequent degeneration of the earlier follicles, has taken place. In a series of careful experiments, Detinova was able to estimate the relative numbers of productive and unproductive follicles in individual females. In one example cited a mosquito laid a total of 305 eggs in 3 batches. On dissection 352 normal thickenings were found, together with 25 deposits of pigment from recently degenerated follicles, *i.e.*, 377 follicles had been formed and undergone full or partial development. The ovaries were found to contain 160 ovarioles, which in 3 cycles should have formed 480 follicles. Thus it was evident that 103 follicles had failed to develop, that is 34 per cycle.

In a further communication, Detinova (1953*c*) considered the effect of retention of a ripe egg from the previous cycle on the changes in the ovarioles. She found that the presence of a retained egg leads to degeneration of the next follicle above it, which otherwise might have developed normally during that particular cycle. If the retained egg is laid at the next ovulation, the same number of thickenings appear in that ovariole as in those which were functioning normally throughout. If the retained egg is not passed out with the next egg batch, degenerative changes appear in it, thus facilitating the growth of newer follicles lying above it.

Application of Polovodova's method

The new technique has been widely used in the Soviet Union to study the age composition of natural populations of *A. maculipennis*. In the Moscow region, Detinova (1953*b*) made detailed observations over the whole of one season, during the course of which over 5,000 mosquitoes

were dissected. Her figures illustrate two interesting features of the pattern of survival of female *A. maculipennis* in a northern latitude. The generation that overwinters emerges in late August and September, the peak numbers being observed in mid-September. Reproductive activity begins again in the following spring from the middle of April onwards. The bulk of the wild population up to the first week in June consists of females that have overwintered. From then on the first summer generation dominates the catches, but individuals that emerged the previous autumn—recognizable by the accumulation of pigment in the ovaries—linger on up till the end of June, by which time they may have laid 10 or 11 batches of eggs. Thus these females have attained the remarkable age of 9 months, the last 2 of which will have been spent in active reproductive life.

TABLE I (from Detinova, 1953*b*)

Showing the numbers of females in different age-groups, and the percentage surviving from one cycle to the next.

	Number of egg layings													
	0	1	2	3	4	5	6	7	8	9	10	11	12	older
Numbers at each age	706	937	921	716	699	564	302	176	70	24	8	2	1	5
Per cent. survival per cycle	—	98	78	98	81	53	58	40	34	33	25			

Detinova (1953*b*) also studied the proportions of females surviving to different ages in natural populations. Some of her results are shown in Table I. The reduction in the numbers caught in each successive age-group is taken to be proportional to the chance of survival from one gonotrophic cycle to the next. However, previous work had shown that many nulliparous females rest in sites other than the houses and cattle sheds in which the catches were normally made. Hence, the deficit of nullipars in relation to those that had laid a single egg batch, as seen in the Table, is of no biological significance. From the rest of the Table it is evident that the percentage survival from one cycle to the next declines sharply with increasing age. The author emphasizes the importance of taking this uneven death rate into account when making epidemiological calculations. The duration of the gonotrophic cycle was studied concurrently and was estimated to last from 3 to 6 days, according to the season.

Shevchenko (1953), using the same technique, studied the age composition of *A. maculipennis* in the region of Kharkov. His figures differ from Detinova's in one important respect, namely the percentage survival from one cycle to the next. Of 2,571 females dissected, 443 were nulliparous (and not in diapause), 1,230 had completed one cycle, 301 two

cycles, 105 three cycles, 49 four cycles, 16 five cycles, and 17 more than five cycles. Thus the reduction in the population between the second and third cycles appeared to be significantly higher than between the older age-groups.

KOZHEVNIKOVA (1953) made similar observations in the region of Stalingrad. Among 2,022 females which were found to be reproductively active, the percentage survival from one cycle to the next was about 50%, although the reduction in the population between the second and third cycles again suggested a rather lower rate of survival (40·7%). It may be noted that both Kozhevnikova and Shevchenko, working in the more southerly parts of European Russia, found that fewer than 1% of the females dissected had survived to lay more than 5 egg batches, whereas Detinova in the Moscow region found that over 10% of the population belonged to age-groups older than this.

TABLE II.

Distribution of age-groups of female *A. maculipennis*, as recorded by different authors. Females in diapause have been excluded.

Author and Region	Number dissected	Number of egg layings								
		0	1	2	3	4	5	6	7	8 and older
Almazova *et al.*,* W. Siberia	3546	43·9	28·2	15·7	8·2	2·6	1	0·4	–	–
—— after use of DDT	4080	57·4	23·4	11·8	6·3	1	0·2	0·04	–	–
Mishukov,* W. Siberia	2589	18·5	23·9	20·9	16·7	10	6	2·2	1·5	0·3
Zorin,* White Russia	3258	13·2	24·4	23·6	19·8	9·8	4·9	2·4	0·9	1·1
Korzhenevskaya,* White Russia	3894	18·2	48·8	18·5	8·1	3·2	1·8	0·8	0·4	0·2
Policarpova,* Riga, 1953	3145	32·4	41·7	17·2	5·4	2·3	0·7	0·2	0·1	0·03
—— 1954	1992	36·1	29·5	20	9·6	3·5	0·9	0·3	0·1	–

* (1957)

The results of other regional studies are set out in Table II. The findings of ALMAZOVA and her co-workers are of interest in demonstrating how house spraying with DDT causes a progressively greater reduction of the older age-groups of mosquitoes. On the other hand, no explanations are offered for the differences in age distribution recorded by different authors in the same region, or by the same author in different seasons. One would also like to know whether the skill or experience of the observer is of any importance.

Detinova (1955) applied the new technique to the study of the changes in the fertility of female mosquitoes in relation in their age. 1,400 wild-caught females were dissected, their age determined by Polovodova's method, and the number of developing follicles counted. While the

fertility of individual specimens varied within wide limits at all ages, the mean fertility fell strikingly with increasing age. The following values of the mean number of eggs per batch were obtained from females in which from the first to the thirteenth egg batch was developing. The figures in brackets refer to the number dissected in each group. First cycle, 276·5 (184); second, 259·9 (272); third, 228·4 (206); fourth, 184·2 (181); fifth, 164·3 (217); sixth, 146·8 (172); seventh, 132·3 (83); eighth, 116·5 (57); ninth, 111 (13); tenth, 98 (10); eleventh, 104·7 (3); twelfth, 21 (1); thirteenth, 13 (1).

Attention was also paid to the question of seasonal changes in fertility. While the data given above indicate the importance of age composition in assessing the fertility of a mosquito population, Detinova was able to show that seasonal differences in the fertility of females at the same age occurred and that these could be correlated to some extent with the size of the mosquitoes. Earlier work by Beklemishev (1944) had shown the influence of larval nutrition on the size of the adults and on the number of ovarioles in the ovaries. Both these factors—age and pre-imaginal conditions—are held, therefore, to affect the fertility of females.

Acknowledgment

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SUMMARY OF RECENT ABSTRACTS*

VI. PLAGUE†

General

Plague has been endemic in Thailand since it appeared there in 1904, and permanent laboratories have recently been established for detection and control. ELBEL and THAINEUA (p. 1186) give an account of the work of these laboratories on the prevalence of plague in rats and on the *Xenopsylla cheopis* index. Plague was found only in the domestic rat, *Rattus exulans concolor*, and *X. cheopis*. NGUYEN-VAN-AI (p. 1185) describes recent outbreaks of plague in Vietnam, which occurred in known old foci. All the strains of *Pasteurella pestis* isolated in one outbreak were sensitive to streptomycin and chloramphenicol, though mostly resistant to other common antibiotics. The treatment of choice was with streptomycin but a few cases resolved on sulphonamides alone. For prevention antiserum and the EV vaccine were used.

MACCHIAVELLO (p. 1407) sums up his own and other people's work on the epidemiology and history of plague in part of Ecuador and Peru. The extension of the disease in both countries in the early part of the century was centrifugal from the ports of entry of infection into the hinterland. He refers to *pestis minor* or ambulatory plague which was caused by *P. pestis* of low virulence and which tended to occur at the beginning or the end of epidemics, especially among children.

Aetiology

In general, BRYGOO (p. 165) found that intraperitoneal inoculation of mice with material suspected of plague, mixed with penicillin (1,000 units), resulted in more isolations of *P. pestis* than were obtained by the percutaneous inoculation of guineapigs.

The amino-acid requirements of *P. pestis* were investigated by DOMARADSKY and IVANOV (p. 814); details are given in the original abstract. The composition of a casein hydrolysate medium for *P. pestis* is given by HIGUCHI and CARLIN (p. 952), who show that the optimum composition varies according to the temperature of incubation (27° or 37°C.). Details are given in the original abstract. On a medium containing excess haemin strains of *P. pestis* were found to form dark brown colonies, and JACKSON and BURROWS (p. 565) devised a special medium for differentiating the pigment-producing from the non-pigment-producing forms. Most strains gave a mixture of both, but some gave homogeneous

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1957, v. 54. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

† For previous articles on plague in this series see the July issues of the *Tropical Diseases Bulletin* each year since 1939.

growths of one form or the other. Mutation was observed from pigmented to non-pigmented forms, and the authors think that *P. pestis* is pigmented in nature and mutates to the non-pigmented form in laboratory growth, with loss of virulence. These authors (p. 566) found that a non-pigmented strain derived from a virulent strain was markedly reduced in virulence but that simultaneous injection of this strain and haemin or ferrous sulphate produced virulent infections in mice. Non-pigmented mutants of non-virulent strains were not rendered virulent in this way.

Englesberg (p. 1409) observed mutation of *P. pestis* to a form which utilized rhamnose, and calculated that this mutation occurred at a constant rate of about $2{\cdot}6 \times 10^{-11}$ per bacterium per generation during the period of positive growth in culture. The mutants were stable and retained all the other characters of the wild type. A positive reaction on Endo's rhamnose medium in 24–36 hours is probably a reliable criterion for distinguishing *P. pestis* from *P. pseudotuberculosis*.

As part of a series of studies on the enzyme system of *Pasteurella pestis* Sagar *et al.* (p. 32) examined the deaminase activity of both virulent and non-virulent strains. Of the 20 amino acids used as substrates only 4 were deaminated appreciably, and no differences were found between virulent and non-virulent strains. Certain other organisms display a correlation between virulence and phosphatase activity, but Sagar *et al.* (p. 423) found no such relationship in *P. pestis*.

Srikantan *et al.* (p. 1186) observed that there was no general correlation between the virulence of *P. pestis* and its oxidative metabolism. Saxeno *et al.* (p. 1186), in the same series of investigations, examined the transamination reactions in virulent and non-virulent strains, which again did not reveal correlation between virulence and transamination.

Crocker *et al.* (p. 677) observed an extracellular substance in electron micrographs of *P. pestis* which may represent the soluble envelope or skin layer which is probably the source of the non-somatic antigens.

By drying *P. pestis* and extracting it successively with ethylene glycol, diethylene glycol and saline Bhagavan *et al.* (p. 814) prepared 3 fractions each of which was found by the agar diffusion precipitation technique to contain a large amount of one antigen and very small amounts of 2 other antigens; 2 of the fractions were highly protective for mice, and 2 reacted strongly with immune serum for *P. pseudotuberculosis*.

In highly purified *P. pestis* toxin Bent *et al.* (p. 1076) identified 18 amino acids and a number of elements.

Investigating the basis of virulence of *P. pestis* Burrows and Bacon (p. 283) found that suspensions were rendered highly sensitive to phagocytosis by treatment with antisera against virulent and non-virulent strains. They found that strains without visible capsulation, which were able to develop resistance to phagocytosis, produced 2 antigens (V and W) which were not produced by strains unable to develop resistance, and that all virulent strains were able to elaborate these antigens but most non-virulent strains [not " virulent strains " as in the original abstract]

were not. For high virulence strains must be able to produce not only fraction 1 (envelope or capsular) antigen but also V or W or both. But since the non-virulent strain EV 76 can develop resistance to phagocytosis although possessing all 3 antigens, at least one other determinant of virulence must exist.

In an examination of *P. pestis* and *P. pseudotuberculosis* antigens by the gel-precipitation method Ransom (p. 566) found that 2 extracellular antigens (probably envelope antigens) were common to both, another was produced by *P. pestis* alone, and *P. pestis* also had 2 intracellular antigens not possessed by *P. pseudotuberculosis*, but the slowly-diffusing meniscus antigen was present in both. One of the unshared antigens probably represents the toxin of *P. pestis*.

Wolochow *et al.* (p. 815) devised an apparatus for exposing monkeys to infectious aerosols, and used it to produce experimental pneumonic plague in them. The LD50 was 2×10^4 inhaled cells and death took place in an average of 6 days. Vaccination with a non-virulent live strain, a killed strain or purified envelope substance did not afford protection. Treatment with 10 mgm. streptomycin per lb. body weight was successful.

P. pestis grown *in vitro* and introduced into the lungs of guineapigs by aerosol inhalation at first showed a diminution in numbers in the lungs, but with virulent strains this was followed by a great increase. Fukui *et al.* (p. 816) show that with a preparation of *P. pestis* grown *in vivo* (*e.g.*, in guineapig lungs) and administered by intratracheal injection there was no initial decrease, but when introduced by aerosol the result was more like that with organisms grown *in vitro*. The early reduction in the number of organisms in the lung was accompanied by greatly increased phagocytosis. Smith *et al.* (p. 1410) recovered, from the lungs of mice 15–30 minutes after exposure to infectious aerosol, about 4·5% of the estimated dose of *P. pestis* per mouse, and noted a further reduction up to about 16 hours. After that the organism increased and at 36 hours all mice had blood infection. Exposure to formaldehyde vapour before infection rendered infection easier, quicker and more virulent, probably because of ciliary paralysis and interference with the production of mucus.

Transmission: Animal reservoirs

In a long paper Blanc (p. 422) explains his belief that bubonic and septicaemic plague are not transmitted to man solely, or even chiefly, from infected rats by the flea *X. cheopis*, but are commonly transmitted from man to man by human ectoparasites such as *Pulex irritans* or *Pediculus corporis*. Many observers have described plague in the absence of rats and have concluded that when the organism has been introduced by *X. cheopis* it can then be maintained as a man-to-man infection by human ectoparasites. The author's views are based on investigation of

plague in Morocco and have been expressed in papers reviewed in earlier volumes of this *Bulletin*.

In a study of vector efficiency in fleas, KARTMAN *et al.* (p. 32) based infection potential on the percentage of fleas proved positive after death—not on bacteriological examination of their faeces, which was unreliable—and vector potential was determined as the percentage of fleas with *permanent* proventricular block. A new component, the blocking-survival potential, was postulated. They estimated the mean time for blocking to take place, and found that transmission of *P. pestis* by fleas without proventricular block was rare, and did not result from fleas with partial block. On the other hand many fully blocked fleas did not transmit. On the whole *X. cheopis* was twice as effective as *X. vexavilis hawaiiensis*. In experiments on the blocking of *X. v. hawaiiensis* and *X. cheopis* with a non-virulent strain of *P. pestis*, by an artificial feeding technique, KARTMAN *et al.* (p. 284) found similar mean infection rates in the two species, but the mean blockage rate was higher in *X. cheopis* than in the other. Certain differences were observed between the various rates in male and female fleas. The vector efficiency of a number of wild rodent fleas was estimated by KARTMAN and PRINCE (p. 678), who used a standardized technique and measured the efficiencies of these fleas at various temperatures. The results are compared with those obtained with *X. cheopis*.

The first recorded account of experimental flea transmission of a non-virulent strain of *P. pestis* is given by SUYEMOTO *et al.* (p. 285), who describe the techniques of artificial feeding they used. In transmission experiments the non-virulent strain was recovered from the spleens of mice 12–24 days after they were bitten by blocked fleas, but there were no deaths and virulence was not enhanced. The proportion of fleas which became blocked was lower than is usual with virulent strains.

BALTAZARD and EFTEKHARI (p. 1076) describe their technique for collecting, manipulating and rearing fleas from rodents.

In a survey of the susceptibility of rodents in New Mexico to inoculation of plague bacilli HOLDENRIED and QUAN (p. 285) found differences ranging from high sensitivity to complete resistance, though most of the rodents which survived the inoculation died of toxaemia after receiving a subsequent massive intraperitoneal injection of about 650 LD50 of the organisms.

In New Caledonia GRENIER and RAGEAU (p. 678) found only 2 likely reservoir hosts—*Rattus rattus* and *R. norvegicus*; no indigenous rodents occur on the island.

Treatment: Immunization: Control

SEMENOVA *et al.* (p. 1410), in experimental work, found bacteriomycin and streptomycin effective in treatment, but not chlortetracycline. Gamma globulin from plague antiserum was more effective than the

serum itself, but was not as useful as the antibiotics, though in certain cases it may be useful in conjunction with the antibiotics.

Brygoo and Courdurier (p. 424) use white mice for estimating the protective value of the avirulent EV vaccine.

When plague broke out in Chiengmai, Thailand, the control measures included first the use of 5% DDT in an edible dust, which was scattered around rat holes and runways; besides the insecticidal effect, this dust attracted the rats and demonstrated their tracks and thus allowed rat control by poisoning in known infested foci. Schulz and Crutkhow (p. 286) describe the methods of control, which included the use of rat traps. *X. cheopis* is susceptible to DDT, but although it is most susceptible at high temperatures (30–32°C.) Netsengevich (p. 679) found no serious diminution of action at low temperatures (4–6°C.), which implies that DDT can be used in refrigerators, cellars, etc., in winter. Having observed that when DDT was administered intragastrically to white mice it was toxic both to the mice and to the fleas which fed on them, and could be detected in the blood for some days, Fedorov (p. 680) found that when it was added to food-baits containing a rat poison, both the mice and the fleas were killed. *Charles Wilcocks*

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

Malaya, Federation of: **Annual Report of the Malaria Advisory Board for the Year 1956** [Anderson, R. E., Chairman]. 15 pp., 1 folding graph. 1958. Kuala Lumpur: Govt. Press. [$1.50.]

The progressive diminution in the number of malaria cases throughout the Federation of Malaya which has been previously reported [see this *Bulletin*, 1957, v. 54, 117] continues unabated; in a population of 6·25 million there were 6,499 admissions to hospital for malaria, 29% of the 1947 figure. These returns refer, however, very largely to peri-urban and estate populations, taking no account of rural villages where only 0·6 of 4 million are protected and where the marked reduction of malaria cannot be assumed to exist. The Board, reviewing the subject, concludes that malaria is still a serious problem and feels concern at the absence of a countrywide co-ordinated scheme aimed at its elimination, recommending the creation of a suitable organization. In consequence, a small committee recommended that a training centre should be established and that pilot schemes for control and eradication should be set up, but when

making tentative financial estimates it concluded that the additional cost involved would preclude the adoption of any continuing scheme.

The section of the report dealing with malaria statistics is concerned with a rebuttal of a Press criticism that the Board has given unrealistic figures for malaria mortality, which are very different from those recorded by the Registrar-General. The Board emphasizes that its figures are deliberately restricted to deaths in hospitals from malaria positively diagnosed by microscope, a standard also adopted in recording admissions to hospital. [No information is, however, given on the proportion of patients suspected to have malaria in whom an examination of the blood is made.]

[It seems to the reviewer that part of this report is concerned to emphasize the unreality of its figures as representing Malaya as a whole, and part to emphasize their reality.] *G. Macdonald*

Vandepitte, J. & Delaisse, J. Sicklémie et paludisme. Aperçu du problème et contribution personnelle. [**Sicklaemia and Malaria. Appreciation of the Problem and a Personal Contribution**] *Ann. Soc. Belge de Méd. Trop.* 1957, Oct. 31, v. 37, No. 5, 703–35, 1 graph. [58 refs.]

This is a detailed article on the population genetics of sickling and the regulation of sickling frequency by the influence of malaria. It is written very clearly and the survey of the literature, which is divided between publications which confirm the resistance of sicklers against malaria and those which do not confirm it, is extensive and up to date. The second half of the paper gives the authors' opinion, results and conclusions.

They compared 800 Africans with malaria with 1,180 controls. The sickle-cell trait was more frequent though not significantly so in the control group. This difference became significant if the examination was restricted to children under 10 and more so when the diagnosis of malaria in infants was only made when the parasitaemia was high, *i.e.*, more than 1,000 parasites per cmm. There is a confirmation of Raper's earlier work [this *Bulletin*, 1955, v. 52, 736]. Thus the maximum parasite count in non-sicklers was 1,050,000 (Raper 800,000), in those with sickle-cell trait 250,000 (Raper 160,000) and in one case of sickle-cell anaemia 11,500. Malaria mortality was closely related to the number of parasites in the peripheral blood, which was lower in sicklers.

The authors state that the malarial mortality in the Congo can be calculated to be responsible for the maintenance of the high sickling frequency on the basis of the differential distribution of severe malaria between sicklers and non-sicklers. *H. Lehmann*

London School of Hygiene and Tropical Medicine. **Memoir No. 12. Studies on the Exo-Erythrocytic Cycle in the Genus** *Plasmodium*.

This book was reviewed on p. 614.

Young, M. D. & Burgess, R. W. **Effect of 25 Milligrams of Pyrimethamine on the Infectivity of *Plasmodium vivax*, St. Elizabeth Strain, to *Anopheles quadrimaculatus*.** *Amer. J. Trop. Med. & Hyg.* 1957, Sept., v. 6, No. 5, 805–7.

4 patients infected with the St. Elizabeth strain of *Plasmodium vivax* were given 25 mgm. pyrimethamine and were then fed upon by *Anopheles quadrimaculatus* at varying intervals. A preliminary feeding before treatment showed infection rates in the mosquitoes of 90%, 23%, 97% and 100% respectively. Parasites and gametocytes continued to be present in the blood of the patient for as long as 7 days after treatment, but if mosquitoes were fed as early as 8 hours, oöcysts became abnormal in appearance and failed to produce sporozoites, while 16 hours after drugging no oöcysts appeared, and the blood remained non-infective for as long as 11 days after treatment.

[See also this *Bulletin*, 1954, v. 51, 9; 532.] *P. C. C. Garnham*

Cefalù, M. & Mariani, M. Ancora sulla vita extradomestica dell' *Anopheles labranchiae* in Sicilia. [**Extradomiciliary Habits of *Anopheles maculipennis labranchiae* in Sicily**] *Riv. di Malariologia.* 1957, Dec., v. 36, Nos. 4/6, 217–26. [20 refs.] English summary.

[See this *Bulletin*, 1954, v. 51, 669.]

Łukasiak, J. Występowanie rozwojowych form *Anopheles maculipennis* Meig. 1818 w wodach obszaru Warszawy i okolicy. [**The Occurrence of Developmental Forms of *Anopheles maculipennis* Meig. in the Water Reservoirs in Warsaw and its Vicinities**] *Przegląd Epidemiol.* Warsaw. 1958, v. 12, No. 1, 73–82, 1 fig.

The English summary appended to the paper is as follows:—

"Thirty water reservoirs in Warsaw and its surroundings were investigated for the degree of intensity of occurrence of *A. maculipennis* in the larval form. It was ascertained that over 52 per cent were anophelogenic and that in them there appeared the eggs, larvae, and chrysalides of two breeds, *A. messeae* in 94 per cent. of cases and *A. typicus* in about 6%. In the waters of the Mokotów suburb larvae of the *typicus* breed were more numerous than the others, exceeding 12 per cent of the larvae caught. On the basis of observation of laboratory cultures of mosquitoes, taking the natural conditions into consideration, it was ascertained that the rate of complete development from egg to imago depended on the vegetative season. In the spring months, this lasted 34 days, in the summer months, 26–29 days, and in the autumn 40 days or over. This period was always a few days shorter for *A. messeae*. The vegetative period of larval development in the Warsaw district differed in particular

years, its length varying from 170 to 195 days. During this period, the flight of winged forms of 4–5 generations of *A. messeae* Fall. 1926 and 3–4 generations of *A. typicus* Meig. 1818 is possible."

Vukasović, P. & Martinović, A. [**Contribution to the Study of the Variety** *Anopheles maculipennis* **Meig. at Vranje and Surroundings**] *Bull. Inst. Hyg.* Belgrade. 1957, v. 6, Nos. 3/4, 1–4. [In Serbian.] French summary.

Out of a total of 1,036 female anophelines, 60% laid eggs when isolated in tubes containing damp filter paper. Most of the females belonged to *A. maculipennis messeae* (353 females), and *A. maculipennis typicus* (216 females) was the only other member of the *maculipennis* complex present. Some of the eggs were atypical (40 of *messeae* and 39 of *typicus*) and 54 other eggs could not be classified. *B. R. Laurence*

Sandulesco, Marie & Marotinesco, Stephanie. Détermination des femelles d'*Anopheles sacharovi* (*elutus*) et des variétés du groupe *Anopheles maculipennis*, par l'identification des "ovipositions obtenues par dissection". [**Determination of Female** *Anopheles sacharovi* **and Varieties of the** *A. maculipennis* **Complex by Identification of Ovipositions obtained by Dissection**] *Arch. Roumaines Path. Expér. et Microbiol.* 1957, Mar., v. 16, No. 1, 144–9.

Females of the *Anopheles maculipennis* complex that die before oviposition can be identified if the mature eggs are removed by dissection, floated on to filter paper, and examined after two to three hours. When natural oviposition was relied upon alone, only 459 females survived to lay eggs, out of 1,370 mosquitoes collected by the Black Sea, and, of these survivors, 27·4% were shown to belong to *A. sacharovi*, and the rest to three other races of *A. maculipennis* (*typicus*—7·8%, *messeae*—32·7%, *atroparvus*—32%). When, in addition, the dissection technique was used, 54·8% of the females were then shown to belong to *A. sacharovi*, 5·1% to *typicus*, 23·6% to *messeae* and 16·5% to *atroparvus*.

The authors point out that, when the identification of races of mosquitoes is dependent on the examination of naturally laid eggs, differential mortality between the races before oviposition will give a false estimate of their abundance. *B. R. Laurence*

Lewis, D. J. **Some Mosquitos of the Blue Nile Valley in the Republic of the Sudan.** *Bull. Entom. Res.* 1958, Mar., v. 49, Pt. 1, 133–55, 5 text figs. & 5 figs. on 2 pls. [Numerous refs.]

This paper should be read in conjunction with one on the fauna of the White Nile [this *Bulletin*, 1948, v. 45, 968], and with the author's other

papers on the mosquitoes of the Sudan [*ibid.*, 1957, v. 54, 118, 499]. The Blue Nile is interrupted along its course by the Sennar dam. The lake-like conditions above the dam are probably responsible for much of the non-biting midge nuisance (*nimitti*) here [*ibid.*, 1956, v. 53, 1283; 1957, v. 54, 1020]. Before the dam was built the locality was intensely malarious, but the reservoir above the dam is not an important breeding place of *Anopheles gambiae*. Here this species was found breeding in rain water pools, and in puddles near the edges of the reservoir, although a few larvae were found among the reservoir weeds. On the other hand *A. pharoensis* was very common among the reservoir weeds, and was one of the commonest mosquitoes biting in the area. Measures recommended against *A. pharoensis* are the use of repellents and screens, the residual spraying of shelters and houses, and the clearance of herbage and straw, which are adult resting places, near houses. Interference with the breeding places, by clearance of the reservoir weeds, is not recommended, as this may result in the formation of larger areas of open water suitable for the breeding of *A. gambiae* and *A. rufipes*. Upstream and downstream from the Sennar reservoir, important breeding places of *A. gambiae*, and other mosquitoes, are *sunt* basins, formed by the growth of *Acacia arabica* on the inner sides of the river meanders, with consequent pooling of the water. These *sunt* basins tend to be inaccessible, and consequently control measures are difficult.

In the Gezira irrigation area, downstream from the dam, *A. gambiae* was common, and bred in rainwater collected in the field irrigation channels, and in rain pools. In the dry season larvae were also found in rock and sand pools in the main river bed. Spraying the houses and huts, which may be crowded with workers, in the irrigation area with BHC has been effective and is also popular, although the author points out that *A. gambiae*, here, is on the edge of its range and possibly may develop resistance. Malaria is a problem of minor importance in Khartoum, where the Blue Nile joins the White Nile, except in years of heavy rainfall, and control measures against *A. gambiae* have been used here since 1904. *B. R. Laurence*

Mouchet, J. & Gariou, J. Cycle gonotrophique d'*Anopheles moucheti* Evans 1925, dans une localité du Sud-Cameroun. [**Gonotrophic Cycle of *Anopheles moucheti* in an Area of the South Cameroons**] *Bull. Soc. Path. Exot.* 1957, Sept.–Oct., v. 50, No. 5, 676–81.

Flanagan, C. L., Schrier, S. L., Carson, P. E. & Alving, A. S. **The Hemolytic Effect of Primaquine. VIII. The Effect of Drug Administration on Parameters of Primaquine Sensitivity.** *J. Lab. & Clin. Med.* 1958, Apr., v. 51, No. 4, 600–608, 2 figs. [21 refs.]

Tarabini, G. **The Anti-Protozoal Action of the Sulphones and the Anti-Malarial Action in particular.** *Leprosy Review.* 1958, Apr., v. 29, No. 2, 111–13.

This is a report of the treatment of 12 cases of *P. falciparum* malaria with Reconan, the dextrose diglucoside of DDS. The dose was 16 gm. during 9 days, repeated after 10 days' rest. Only 2 of the 12 patients relapsed. Further study in 2 patients showed that this result was due to the DDS contained in the drug. Trials at the leprosarium of Fontilles led to the conclusion that oral sulphones also have an effect in preventing infection with *Entamoeba histolytica.*

If these findings are confirmed, the substance may be useful against malaria in leprosy patients, and for prophylaxis. *Ernest Muir*

Fairley, N. H. *et al.* **Experiments with Antimalarial Drugs in Man. VI. The Value of Chloroquine Diphosphate as a Suppressive Drug in Volunteers exposed to Experimental Mosquito-Transmitted Malaria. (New Guinea Strains.)** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Nov., v. 51, No. 6, 493–501.

In these experiments the value of chloroquine as a suppressive was assessed in light and heavy *Plasmodium vivax* and *P. falciparum* infections. The work was part of the programme of research carried out at Cairns, Australia, in the later part of the war of 1939–45.

Of 12 volunteers exposed to the bites of 20–22 *Anopheles punctulatus punctulatus* heavily infected with *P. vivax*, 2 acted as controls, 2 were given suppressive atebrin [mepacrine] and 8 received chloroquine diphosphate in doses of 0·2 gm. base twice daily for 4 days and thereafter 0·1 gm. base daily for 24 days. Both the controls developed overt malaria but parasites were not demonstrated in thick films from any of those taking chloroquine or atebrin. One of the 2 having atebrin and all 8 having chloroquine exhibited minor clinical or haematological abnormalities characteristic of suppressed malaria. These included slight elevation of temperature, headache, tenderness over the liver and a shift to the left in the neutrophil leucocytes in the blood with a relative leucopenia and decrease in the lymphocytes.

Subinoculations were made from 3 test volunteers on the 8th, 4 on the 9th and 3 on the 10th days after exposure. Those performed on the 8th day were, as expected, negative, but all those volunteers who received the remaining subinoculations developed overt *P. vivax* infections. Both volunteers who received atebrin and all 8 who received chloroquine developed overt *P. vivax* malaria when suppressive treatment was discontinued. After routine treatment with quinine, atebrin and plasmoquine the 2 who had received atebrin, one of the controls and 6 of the 8 who had had chloroquine developed further secondary attacks of malaria.

2 volunteers with controls were each exposed to the lighter infection

resulting from the bites of 2 mosquitoes infected with *P. vivax*. Both controls developed overt malaria and the test volunteers although not exhibiting parasites in thick blood films were shown by subinoculation to have suppressed primary *vivax* malaria. After cessation of suppressive therapy both developed overt infections and one had a secondary attack after standard treatment.

Of a group of 11 volunteers subjected to the bites of mosquitoes harbouring sporozoites of *P. falciparum*, 8 received chloroquine and 2 atebrin in doses similar to those used in the experiments with *P. vivax*, and the control received no drug. Overt malaria developed in the control on the 11th day after infection, it did not occur in those taking atebrin or chloroquine, but both persons taking atebrin and 7 of the 8 taking chloroquine exhibited minor clinical or haematological features of suppressed malaria. Subinoculation experiments were carried out on the 8th day after infection in 2 volunteers receiving chloroquine, both with positive results. After cessation of suppressive treatment no subject developed overt malaria during 80 days of observation. Premunity to the strain of malarial parasite used was then shown to be absent by submitting the 10 volunteers to further infective mosquito bites after which all developed overt *P. falciparum* infections.

In the volunteers taking suppressive chloroquine the results were identical with those in similarly infected volunteers taking atebrin and it was shown that both of these drugs suppress *P. vivax* malaria and radically cure *P. falciparum* malaria by virtue of their schizontocidal action on the erythrocytic parasites and not by any direct effect on exo-erythrocytic forms.

[See also this *Bulletin*, 1947, v. 44, 175.] *A. W. Woodruff*

Davey, D. G. & Robertson, G. I. **Experiments with Antimalarial Drugs in Man. VII. The Suppressive Effect of 50 mg. of Chloroquine Base Daily in British Troops exposed to Infection with** *Plasmodium falciparum*. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Nov., v. 51, No. 6, 502–4.

Although there has been no indication that proguanil has failed to give very effective protection against malaria to workers on estates and to troops in Malaya, where during the recent emergency the incidence of malaria among service personnel was probably the lowest ever recorded for any force operating in a malarious area, nevertheless when the efficacy of proguanil as a malarial suppressant in Malaya was not known, information concerning the efficacy of chloroquine as an alternative to it was sought. Chloroquine in doses of 0·1 gm. daily having been shown to be effective it was desirable to ascertain whether a lower dosage would be similarly effective. To 20 volunteers therefore 50 mgm. chloroquine base was given daily without the prior administration of a loading dose. Volunteers were bitten intensely on the first day of infection so that the

challenge would be particularly severe before a high concentration of chloroquine had been built up within the body. Of these volunteers, 8 were infected both with a Malayan strain of *P. falciparum* known to be resistant to proguanil and with the Mombasa strain, 8 with a Lake Victoria strain of *P. falciparum* and 4 with the Mombasa strain of *P. falciparum*; 2 others were protected with proguanil and infected with the Lake Victoria strain of *P. falciparum*.

All volunteers were protected throughout from major malarial symptoms, but a few of those taking chloroquine, although neither of those taking proguanil, had minor symptoms.

The conclusion was reached that 50 mgm. chloroquine base taken daily acted as a satisfactory suppressive for non-immune volunteers infected with one or more of three strains of *P. falciparum*. *A. W. Woodruff*

Clyde, D. F. & Shute, G. T. **Resistance of *Plasmodium falciparum* in Tanganyika to Pyrimethamine administered at Weekly Intervals.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Nov., v. 51, No. 6, 505–13, 2 figs. [10 refs.]

The authors have already reported apparent resistance of *Plasmodium falciparum* to pyrimethamine in Tanganyika [see this *Bulletin*, 1954, v. 51, 678]; they have now extended their observations which confirm the earlier results. The trials were carried out on a group of people whose number became stabilized at 400 after 15 months of prophylaxis. They lived in a holo-endemic area near Muheza and showed a parasite rate originally of 88% in the 3–5 years age-group (76% 0–2 years; 24% adult) with all 4 species contributing. The weekly dosage scale was 6–25 mgm. for infants, and up to 50 mgm. for adults, and was started after a 4-aminoquinoline "clean out". After 5 months' prophylaxis, all species of *Plasmodium* had disappeared except *P. falciparum*, of which 7 infections (in 215 recipients) remained; after 10 months the *P. falciparum* rates in treated children had returned to 53% and 46%, respectively, in two adjacent schools, at which figures they approximately stayed during the next 4 months, when prophylaxis was stopped. The rates returned to normal 6 months later, together with the other species of parasite.

Chemical analysis indicated that the drug had been taken. Full courses of treatment with pyrimethamine failed to dislodge the parasites, even when pushed to the subtoxic level. The degree of resistance was at least 15-fold.

The resistant parasites spread to untreated persons in the immediate vicinity, but began to disappear 2 miles away and were absent at 5–12 miles. The authors consider that the resistant gametocytes must therefore be viable. The resistant parasites showed minor morphological differences which were not constant, and in most age-groups were at a density 20% lower than the susceptible strain; they remained sensitive to proguanil. *P. C. C. Garnham*

Raffaele, G. & Coluzzi, M. Ricerche sul problema della resistenza degli anofeli agli insetticidi. [**Studies on Resistance of Anophelines to Insecticides.**] Nota I. Alcune osservazioni sulle modalità di attuazione del metodo di Busvine e Nash. [**I. Observations on the Use of the Busvine-Nash Test**] *Riv. di Malariologia.* 1957, Dec., v. 36, Nos. 4/6, 157–66. English summary. Nota II. Su alcune variazioni della sensibilità degli anofeli al D.D.T. [**II. Variations in the Sensitivity of Anophelines to DDT**] *Ibid.*, 167–76, 2 graphs. English summary. Nota III. Indagine sulla sensibilità al DDT degli anofeli di varie regioni d'Italia dopo 10 anni di trattamento con insetticidi. [**III. Sensitivity to DDT of Anophelines from Different Parts of Italy after 10 Years Spraying**] *Ibid.*, 177–202. 1 graph. [16 refs.] English summary.

I. The authors have used the Busvine–Nash test [this *Bulletin*, 1953, v. 50, 1176] for measuring susceptibility to DDT of some Italian mosquitoes. They made two slight changes, the main one being to use only one mosquito per exposure vial. Their results showed lower kills than other workers and they attribute this partly to testing with single insects and partly to very careful handling, thereby avoiding all control mortality.

II. By repeated tests with this technique, the changes in susceptibility of *Anopheles maculipennis typicus* were followed throughout the season in a site near Frosinone (about 50 m. south of Rome). Susceptibility was low in early summer, but rose somewhat after the first half of August. This was attributed to the fact that maximum breeding of this mosquito reaches a peak in July and then falls sharply. Consequently, the mean age of mosquitoes caught after early August begins to rise and this would account for their greater susceptibility. Females in the actual hibernation state, however, were decidedly resistant, as noted by de Zulueta *et al.* [*ibid.*, 1957, v. 54, 1052].

III. Tests of various anophelines in different parts of Italy gave no indication of any difference in susceptibility between specimens from areas sprayed for 10 years and others from untreated zones. Despite the low kills observed in the tests, it is concluded that no true, induced, resistance in mosquitoes has resulted from DDT spraying in Italy. The mosquitoes appear still to be sensitive to the irritant action of DDT, which drives them out of sprayed houses before they acquire a lethal dose. *J. R. Busvine*

Garnham, P. C. C., Lainson, R. & Cooper, W. **The Tissue Stages and Sporogony of** *Plasmodium knowlesi*. *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Sept., v. 51, No. 5, 384–96, 14 figs. (8 coloured) on 2 pls. [19 refs.]

Plasmodium knowlesi is of particular interest in tropical medicine because it is infective to man and because the malarial infection in its

natural host (*Macaca irus*) might actually be a zoonosis, as suggested by the authors. Moreover, it is pathogenic to the monkeys and has a periodicity of 24 hours in the blood.

The present study concerns the sporogony and exo-erythrocytic development of *P. knowlesi*. Preliminary experiments with an old and new strains have shown that *Anopheles stephensi* was an unsuitable intermediate host for this parasite, whereas it developed well in *A. aztecus*, which was therefore used in subsequent experiments. In mosquitoes fed on infected monkeys on the 5th and 6th day after inoculation, oöcysts became mature 8–9 days later. Infection was produced in 3 monkeys by intravenous inoculation of sporozoites obtained from the salivary glands or ruptured oöcysts of several hundred mosquitoes. The tissue stages of development of *P. knowlesi* were seen in material obtained by liver biopsy. They were restricted to pre-erythrocytic schizogony lasting 5½ days, after which blood-invasion takes place, while the ruptured tissue schizonts are phagocytosed.

The tissue stages are described in detail and illustrated in an excellent colour plate painted by one of the authors. The 3¾-day-old schizont measures 25 μ in diameter and the 5¼-day-old schizont 40 μ; it is usually smooth and more or less rounded in outline. The cytoplasm and nuclei are at first not associated together, but later the cytoplasm become condensed into "flocculi", which are then "seeded" with chromatin granules. Groups of 4 of these (probably chromosomes) constitute a Feulgen-positive nucleus. Finally the cytoplasmic masses with their nuclei break down to give rise to small merozoites. *C. A. Hoare*

Garnham, P. C. C. & Bray, R. S. **The Influence of Immunity upon the Stages (including Late Exo-Erythrocytic Schizonts) of Mammalian Malaria Parasites.** *Rev. Brasileira Malariologia.* Rio de Janeiro. 1956, Jan., v. 8, No. 1, 151–60, 4 coloured figs. on pl. [15 refs.]

Most of the available data on immunity in malaria concern the blood cycle of the parasite, whereas the effect of acquired immunity upon the tissue stages is almost unknown. The authors have studied this phenomenon in immune macaque monkeys, by intravenous inoculation of sporozoites of *Plasmodium vivax* and *P. cynomolgi* (from salivary glands of infected *Anopheles maculipennis atroparvus*) into monkeys immune to the corresponding blood forms. The results were assessed by examination of sections of liver samples obtained by biopsy, while parasitaemia was followed by daily examination of stained blood films.

As is known, rhesus monkeys are refractory to infection with blood forms of *P. vivax*. The authors inoculated into one animal 94 infected salivary glands, and 8 days later removed a piece of its liver: examination of sections failed to reveal any tissue forms, thus showing that this

monkey is resistant to infection with the sporozoites of the human parasite.

In the case of *P. cynomolgi*, infected glands were inoculated into immune and non-immune monkeys, whose livers were examined in sections of material removed 7 days later. The number of schizonts found in the susceptible animal was about three times greater than that in the immune animal. In order to determine whether this difference was due to suppression of the initial tissue development of the parasite, 2 susceptible monkeys were inoculated with sporozoites previously exposed *in vitro* to the action in one case of immune, in the other of non-immune sera, and biopsies were taken 8 days later. Counts of the schizonts found in liver sections revealed no significant differences in the 2 monkeys. Another experiment was designed to find out whether fluctuations in the numbers of tissue forms in various monkeys were due to individual variations. In this experiment sporozoite suspensions were inoculated into 4 immunized and 1 control monkeys, and counts of schizonts were made in sections of liver material removed by biopsy 8 days later. It was found that the density of schizonts varied considerably and bore no relation to the immune state of the animals. It is concluded " that the influence of immunity on pre-erythrocytic schizogony is probably nil or negligible ". It was also shown that immunity has no effect on the morphology of the tissue stages, since these are similar to those occurring in susceptible monkeys.

The authors have studied the cellular reaction in the liver of monkeys infected with *P. cynomolgi*, and found that none is present until the tissue schizonts rupture, when there is a response on the part of polymorphonuclear leucocytes which are mobilized around the schizont.

C. A. Hoare

MOHIUDDIN, A. **Notes on a New Strain of** *Plasmodium inui*. *Riv. di Malariologia*. 1957, Dec., v. 36, Nos. 4/6, 203–8. [10 refs.]

A new strain of *P. inui* isolated in Malaya from an infected monkey, *Macaca irus*, was studied by inoculation into a splenectomized rhesus monkey and by transmission by infected mosquitoes into 2 rhesus monkeys, one splenectomized and the other normal.

The morphology followed the original description by SINTON [this *Bulletin*, 1934, v. 31, 691], differing only in showing more prominent stippling.

Anopheles maculipennis atroparvus and *A. aztecus* were infected. *A. aztecus* showed the higher rate of infection, but its survival was poor as compared with *A. m. atroparvus*.

A rhesus monkey carrying another strain of *P. inui* was inoculated with blood containing numerous parasites of the strain under examination; since no change in the parasitaemia occurred it was assumed that cross-immunity between the two strains existed.

W. E. Ormerod

Greenberg, J. & Kendrick, Louise P. **Parasitemia and Survival in Inbred Strains of Mice infected with** *Plasmodium berghei*. *J. Parasitology*. 1957, Aug., v. 43, No. 4, 413–19, 2 figs.

From previous experiments on inbred mice infected with *Plasmodium berghei*, the authors concluded that the higher the parasitaemia of mature red cells during the first week of infection, the more likely the host will not survive beyond this period, the degree of parasitaemia being a heritable characteristic of each strain of mice. The length of survival, *i.e.*, resistance to malaria, therefore represents the inherited power of the mouse to control parasitaemia during the first week after inoculation of the parasites.

In the present paper an account is given of experiments devised to test this hypothesis. For this purpose, mice of 6 inbred and one Swiss strains were inoculated intravenously with doses of 1 million parasitized erythrocytes from Swiss donors, and their blood was examined microscopically for the percentage of mature infected erythrocytes. The results (shown in tables and graphs) indicate that the Swiss strain of mice had significantly higher counts than all the inbred strains of mice, while one of the latter had significantly lower counts. Within the individual strains, parasitaemia in mice dying before the tenth day was twice as high as in those dying later. However, when different strains were compared, there was little correlation between average sixth day parasitaemia and the survival period. It is concluded that these two variables are determined by the strain of mouse. *C. A. Hoare*

Greenberg, J. & Kendrick, Louise P. **Some Characteristics of** *Plasmodium berghei* **passed within Inbred Strains of Mice.** *J. Parasitology*. 1957, Aug., v. 43, No. 4, 420–27, 4 figs.

Experiments described in this paper were undertaken in order to determine the behaviour of *Plasmodium berghei* after serial passages through inbred strains of mice. From Swiss mouse-donors (in which the parasite was normally maintained) the parasite was inoculated intravenously into mice belonging to 6 inbred strains (as well as the homologous one) after which 21 serial weekly passages were made through each of these strains. Observations were made on the percentage of infected mature erythrocytes and on the survival time for each mouse. The parasitaemia found at the end of the first week varied from 1–2% in two inbred strains and 47% in Swiss mice. A comparison of these results with those obtained previously [see above], when Swiss donors were used to infect the inbred mice, showed that in 3 inbred strains there was no apparent difference between the course of infection in passages from Swiss mice and from " within-strain " donors, but in one inbred strain the counts for " within-strain " passages were about 10% lower, while

in another case maintenance within one strain of mouse brought about a gradual and significant fall in parasitaemia. Furthermore, mice infected with parasites passaged "within-strain" lived significantly longer than mice infected from Swiss donors. *C. A. Hoare*

FABIANI, G. & ORFILA, J. Action du zymosan sur la guérison et l'infection latente de rongeurs infectés expérimentalement par *Plasmodium berghei*. [**Action of Zymosan on the Cure and Latent Infection of Rodents experimentally infected with** *Plasmodium berghei*] *C.R. Soc. Biol.* 1957, v. 151, No. 5, 948–9.

The following is a translation of the authors' summary:—

Injection of zymosan, which produces a fall of properdin levels in rats and mice, was carried out in 27 rats and 6 mice when their malaria was cured. Relapse occurred in only 10 of them and was mild in all the rats. It would seem that zymosan can bring about disappearance of the parasites, since splenectomy revived the malaria in only 5 of 18 rats in which it was subsequently carried out. *H. J. O'D. Burke-Gaffney*

JORDAN, Helen B. **Host Resistance and Regulation of the Development of** *Plasmodium lophurae* **in Pheasants, Coots and Domestic Pigeons.** *J. Parasitology*. 1957, Aug., v. 43, No. 4, 395–408, 6 figs. [14 refs.]

An account is given of the results of a comparative study of the course of infection in (a) chickens, (b) pheasants (*Phasianus colchicus*), (c) coots (*Fulica americana*) and (d) pigeons (*Columba livia*), experimentally infected with *Plasmodium lophurae*. This investigation was undertaken to determine the effects of various hosts upon the asexual development of the parasite, with the following results. The mean periodicity in the 4 groups of birds (a–d) was (in hours): (a, b) 36–40, (c) 32–36, (d) 48–56; the mean number of merozoites produced by each schizont was: (a) 11·7, (b) 13·8, (c) 15·4, (d) 11·00; the number of parasites per 10,000 red cells at the height of parasitaemia was (a) over 9,000, (b) over 3,000, (c) about 10,000, (d) about 6,000. Both innate and acquired immunity came into play, bringing about a decline in parasitaemia, with the destruction of merozoites, amounting to 60–80% in (a) and (b), 25–98% in (c) and 50–83% in (d). The results are described in some detail and are illustrated by tables and graphs.

The data obtained in this study show that the course of infection and developmental pattern of *P. lophurae* are determined by the species of avian host, which should therefore be taken into consideration in any work in which this parasite is used. *C. A. Hoare*

Manwell, R. D. **Blood Parasitism in the English Sparrow, with certain Biological Implications.** *J. Parasitology.* 1957, Aug., v. 43, No. 4, 428–33.

The author describes the results of a survey for blood protozoa in the house sparrow (*Passer domesticus*), carried out in the United States. The study was made by examination of stained blood films and tissues smears, as well as by subinoculation of their blood. The results of this survey, as well as previous records from the same host, are summarized in a table. Out of 703 birds examined by the author 36 were infected with plasmodia represented by *Plasmodium cathemerium*, *P. relictum*, *P. circumflexum*, *P. elongatum*, 41 with *Atoxoplasma* and 7 with *Haemogregarina*.

C. A. Hoare

TRYPANOSOMIASIS

*In this section abstracts are arranged as far as possible in the following order:—*African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed:— epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

Soltys, M. A. **Immunity in Trypanosomiasis. I. Neutralization Reaction.** *Parasitology.* 1957, Dec., v. 47, Nos. 3/4, 375–89, 1 fig. [22 refs.] **II. Agglutination Reaction with African Trypanosomes.** *Ibid.*, 390–95, 1 fig.

These two papers describe respectively the use of the neutralization and the agglutination reactions in the detection and study of trypanosomal antibodies. Various strains of human and animal trypanosomes were used. In the neutralization reaction serial dilutions of serum are incubated with living trypanosomes and their infectivity tested by injection into mice. The agglutination reaction is performed with a living antigen of trypanosomes from the blood of mice, serial dilutions of serum are added and the titre of agglutination read after 15 minutes at room temperature. The neutralization reaction performed by this technique distinguishes between different strains within the species of trypanosomes tested, and the agglutination reaction between species. Details are given of the development of both types of antibody, especially in the rabbit where the immune sera produced by infection cured by Suramin, and by hyperimmunization with dead trypanosomes, have been compared in both types of reaction: a more prolonged immunity followed the cured infection, especially in the case of neutralizing antibodies.

The author has also studied the changes that occur when a strain of *T. brucei* is passaged in a series of 6 rabbits. After the first passage the

trypanosomes became insensitive to neutralization with the serum of the host rabbit or with the sera of the other 6 rabbits; all these 6 sera, however, continued to neutralize the parent strain which had been maintained throughout in mice. Analogous changes occurred at the third passage in the agglutination reaction: the author points out that these findings do not agree with the current theory of antigenic modification of the strain, and he regards the strain as having become " serum resistant " after being subjected to the high concentration of antibody present in the rabbit, as a strain subjected to sublethal concentrations of drug will become " drug resistant "; he postulates a protective mechanism rather than an antigenic change. In addition he shows that the strain in fact becomes drug resistant as after the third passage it becomes insensitive to Suramin.

[In addition these papers contain many details of the tests themselves and of the properties of the antibodies. A serious misprint occurs on page 379, Table 3, where the titre of Serum *T. brucei* " O " against *T. brucei* trypanosome appears as O. This (confirmed by personal reference to the author) should read 1 in 320.] *W. E. Ormerod*

Trincao, C., Carvao Gomes, F. & Bragança Gil, F. Le temps moyen de vie du globule rouge dans la maladie du sommeil. [**The Mean Life of the Red Blood Corpuscle in Sleeping Sickness**] *Bull. Soc. Path. Exot.* 1957, Sept.–Oct., v. 50, No. 5, 718–26, 8 figs.

The authors have determined the life span of red cells made radioactive by the incorporation of ^{51}Cr, and found it considerably lowered in 4 cases of sleeping sickness. They found it to be 83, 100, 93 and 99 days, respectively. The life span of red cells from normal people measured by this technique is 120 ± 10 days. *H. Lehmann*

Trincão, C. & Parreira, F. A cultura *in vitro* dos megacariocitos na doença do sono. [*In vitro* **Cultivation of Megakaryocytes in Sleeping Sickness**] *Anais Inst. Med. Trop.* Lisbon. 1957, Mar.–June, v. 14, Nos. 1/2, 105–9, 6 figs. on pl.

The English summary appended to the paper is as follows:—

" The authors studied the results of Hotchkiss polysaccharide stain after having cultivated the bone marrow of 2 sleeping-sickness patients. In the bone marrow fragments observed before and after 24, 48 and 60 hours of incubation, the behaviour of the stained megakaryocytes does not agree with Sacchetti and Bianchinis description of the megakaryocytes of thrombopenic purpura cases, rather staining like megakaryocytes from normal subjects, or from subjects with non thrombopenic thrombopathies."

[See this *Bulletin*, 1953, v. 50, 93.]

DE ANDRADE SILVA, M. A. **The Value of Drugs commonly used in the Treatment of *T. rhodesiense* Sleeping Sickness.** *Anais Inst. Med. Trop.* Lisbon. 1957, Mar.–June, v. 14, Nos. 1/2, 159–70.

This is an appraisal of various drugs used for the treatment of human trypanosomiasis (*Trypanosoma rhodesiense*) in Africans in Mozambique between 1942 and 1955. 1,346 patients were treated; they usually were re-examined 2 and 6 months after treatment, and subsequently at 3-month intervals. Those treated with antrypol or pentamidine who still yielded parasites, or whose cerebrospinal fluid [CSF] was abnormal, after 2 months were re-treated with another drug; those whose CSF was abnormal 6 months after tryparsamide treatment were re-treated with this or with Arsobal. As Arsobal causes a rise in the cell and protein content of the CSF the first examination after the use of this drug was at 6 months.

36 patients with early or borderline disease were given antrypol (or Bayer 205); in 22 of these the CSF was normal; 9 of the latter were considered to be cured. 46 similar patients were given pentamidine; 14 were considered cured. 737 in a later stage were treated with both antrypol and tryparsamide, and 160 of them were believed to be cured; the disease or, rarely, toxic side-effects, was the cause of death in 219 (29·7%) who died in hospital, but 94 others died in their villages. 222 were given both pentamidine and tryparsamide; 34 of them were thought to be cured. Arsobal was used in 272 late cases; 65 of these patients were probably cured. Tryparsamide and Arsobal were used for 21 late cases in poor condition, and no relapses were observed. Arsobal treatment was given to 34 patients previously unsuccessfully treated with tryparsamide; 3 of them are now thought to be cured.

Patients treated with Arsobal benefited to a greater extent than did those treated with the other drugs; the mortality from the disease in the 339 given this drug was comparatively low; nevertheless 27 (6·9%) of them died from the toxic effects of the drug, so great caution and continuous vigilance is necessary when Arsobal is given.

Of the original total of 1,346 patients variously treated 1,252 were in advanced stages, and the others early or borderline; 293 of the total are considered, after adequate observation, to be cured; others have not been under review long or closely enough for a proper decision.

A. R. D. Adams

DE ANDRADE SILVA, M. A. & CASEIRO, A. **Prophylactic Action of Diamidines against *T. rhodesiense* Infection.** *Anais Inst. Med. Trop.* Lisbon. 1957, Mar.–June, v. 14, Nos. 1/2, 171–7.

There was an outbreak of sleeping sickness (*T. rhodesiense*) near the Tanganyika border in Mozambique; 32, 75 and 104 new cases were detected in 1951, 1952 and 1953 respectively in a population of about 15,000. A mobile unit was formed to examine the inhabitants and to

inject intramuscularly 4 to 5 mgm./kgm. of pentamidine isethionate into those at risk on 4 occasions at intervals of 6 months. Of 16,946 people registered 11,869 had a first injection, 7,952 had a second, 5,165 a third, and 4,092 a fourth. The blood was examined on the occasion of each injection. In 1954 59 new cases were discovered in the first quarter of the year, and 5, 9 and 5 respectively in the next 3 quarters. In 1955 the comparable figures were 8, 6, 6 and 5; 9 were disclosed in the first 4 months of 1956. Of the 53 found after the first quarter of 1954, 47 had had no prophylactic injections.

Side-effects of the injections were one abscess, and a case of gas gangrene; there also were sweats, vomiting, abdominal pains, diarrhoea, general discomfort and urticarial eruptions in that order of frequency in some other cases. In 2 instances there was severe vomiting and loss of consciousness, which were relieved by adrenaline and heart stimulants. The diamidines therefore proved most useful in the arrest of this epidemic of *T. rhodesiense* sleeping sickness. *A. R. D. Adams*

WARREN, L. G. **Biochemical Studies on Chicken Macrophages infected *in vitro* with *Trypanosoma cruzi*.** *Exper. Parasit.* New York. 1958, Jan., v. 7, No. 1, 82–91, 2 figs. [24 refs.]

Tissue culture methods have been used to study the host-cell-parasite relationship as it affects glucose consumption, lactic acid production and changes in amino-acid content of medium during culture of *T. cruzi* in chicken macrophages. Roller tube cultures of these cells were used in a medium of 50% inactivated chicken serum and balanced salt solution at 37°C. Infecting material of culture forms of the trypanosome grown in diphasic medium was added to 5–7-day-old macrophage cultures. The medium was set aside at suitable times for chemical analysis and counts of the parasites were made in stained smears. It was observed that before inactivation chicken serum lysed the crithidial and trypanosome forms present in added culture materials but not blood forms of *T. cruzi*. Parasitized cultures showed an increased rate of glycolysis, but the normal pattern of glucose metabolism remained unaltered. It appeared that parasite multiplication was not dependent on outside sources of glucose but rather on the cell content of this substance or a precursor. Increased consumption of glucose was not correlated with parasite density. The same amino acids were present in parasitized and non-parasitized culture medium. *J. D. Fulton*

HERBIG-SANDREUTER, A. **Further Studies on *Trypanosoma rangeli* Tejera 1920.** *Acta Tropica.* Basle. 1957, v. 14, No. 3, 193–207, 1 fig. [12 refs.]

The studies described in this paper were undertaken to discover the multiplication forms of *Trypanosoma rangeli* in the mammalian host and

to establish the differential diagnosis between this trypanosome and *T. cruzi*. For this purpose, numerous new-born mice and 2 macaque monkeys were infected with trypanosomes from cultures in Razgha's medium. In the mice there was a high degree of parasitaemia by the fourth day, after which it dropped until after 20 days the infection became latent for 3 months. In the monkeys there was a low-grade parasitaemia between the first and seventh weeks after inoculation, which could be detected only by xenodiagnosis or haemoculture. The tissues of infected mice were examined from 24 hours to 3 months after inoculation in serial sections of the entire animal (baby mice) or of different organs (older mice and monkeys). Although thousands of sections were examined, no developmental forms of the trypanosome could be detected in any of the tissues, nor was there any evidence of pathological changes. The author likewise found no division forms of *T. rangeli* in the blood.

A short section, accompanied by a table and figures, deals with the differential diagnostic characters of this trypanosome and *T. cruzi*.

[For previous studies by the author, see this *Bulletin*, 1956, v. 53, 560.] *C. A. Hoare*

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

Inoki, S., Nakanishi, K., Nakabayashi, T. & Ohno, M. **Fine Structure of the Flagellum of *Leishmania donovani* revealed by Electronmicroscope.** *Med. J. Osaka Univ.* 1957, Mar., v. 7, No. 4, 719–29, 10 figs. on 5 pls. [13 refs.]

A description is given of the minute structure of the flagellum in the leptomonad forms of *Leishmania donovani*, grown in Tanabe's liquid medium and studied by electron microscopy. For this purpose the flagellates were concentrated by centrifugation of the culture fluid and washed in saline, after which they were fixed either by drying, or in osmic acid, as well as cut in sections, and examined under an electron microscope.

It was shown that the flagellum is composed of an axoneme consisting of one central fibril surrounded by 9 others, all being transversely striated and enclosed in a common sheath. The flagellum arises from the bottom of a pit-like depression in the body and emerges through an aperture in the " cell membrane " [periplast].

The electron microscopic structure of the flagellum is illustrated in a number of photomicrographs and a diagram. *C. A. Hoare*

Monsur, K. A. & Khaleque, K. A. **Preparation of a Purified Antigen from Kedrowsky's Bacillus for Complement-Fixation Test for Kala-Azar.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1957, Nov., v. 51, No. 6, 527–32.

A complement-fixation test, with Kedrowsky's bacillus as antigen, has proved useful in the diagnosis of kala azar [see this *Bulletin*, 1956, v. 53, 734]. An improved antigen was obtained by preparing, testing and discarding various fractions of washed and dried Kedrowsky's bacilli, grown in 5% glycerin broth. The first alcoholic extract contained practically no antigen; the second alcoholic extraction from a reflex condenser gave a similar result, while both these fractions were highly anti-complementary. Continued extraction in a Soxhlet apparatus produced a fluid with negligible antigenic activity, but the solid residue from this extraction, suspended in saline (and after further extraction with acetone) showed high antigenic activity, highest after the acetone treatment, when fixation occurred in serum dilutions of up to 1 in 400 (in a 1 in 256 dilution of the antigen, though a standard dilution of 1 in 16 or 32 is recommended). The last fractions tended to become anti-complementary on standing for several months. The final fraction possesses 10 times the antigenic activity of earlier methods. *P. C. C. Garnham*

Jopling, W. H. **Kala-Azar in a Child of Five Years.** [Correspondence.] *Med. J. Australia.* 1958, Jan. 18, v. 1, No. 3, 88.

[This letter refers to the case of kala azar recorded by Rigg in Australia, and the treatment employed. See this *Bulletin*, 1957, v. 54, 938.]

The author quotes Napier [*ibid.*, 1950, v. 47, 341] to the effect that in the treatment of kala azar "there is a drug of choice for each geographical area".

Children tolerate antimonials well, probably better than adults. In treating kala azar in children, the dosage should be adjusted accordingly, since calculations in terms of body weight do not take into account the diluting effect of the large volume of blood in the spleen. Removal of the spleen in difficult cases does not necessarily eradicate the infection which may persist in the liver. *B. G. Maegraith*

Marroquin, F. & Biagi, F. Estudio de 19 biopsias de leishmaniasis tegumentaria de México. [**Study of 19 Biopsies from 18 Patients with Cutaneous Leishmaniasis in Mexico**] *Rev. Latinoamericana de Anatom. Patol.* Caracas. 1957, July–Dec., v. 1, No. 2, 145–50, 4 figs. on 2 pls. [13 refs.]

The English summary appended to the paper is as follows:—

"Eighteen cases of cutaneous leishmaniasis from one of the endemic zones of Mexico were studied. Chronic, non specific inflammatory lesions

were found. The demonstration of the parasites is the only specific element that permits histopathological diagnosis.

" Parasites were observed in the sections of 7 cases and in smears of 4. Leishmanias were present in recent cases and usually absent in those of several years duration."

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

Fox, J. P. & Jordan, Martha E. El empleo de la cepa E de *R. prowazeki* en la inmunización contra el tifo epidémico. [**The Use of Strain E of** *R. prowazeki* **for Immunization against Epidemic Typhus**] *Bol. Oficina Sanitaria Panamericana.* 1958, Mar., v. 44, No. 3, 191–8. [11 refs.]

The English summary appended to the paper is as follows:—

" Five and one-half years of experience in the use of living, avirulent strain E as vaccine has given the following information:

" 1. The vaccine is safe to use in man, since nearly 20,000 inoculations have produced no serious illness, although reactions do occur. It is unlikely that rickettsiae of strain E could be further transmitted by lice, since invasion of the blood stream apparently does not occur. One speculative danger, in an endemic area, would be in preventing disease in the young, but having them eventually become susceptible at an age when more serious illness would result, assuming that strain E-induced immunity is not permanent.

" 2. The intramuscular route of inoculation is preferable, and a ·25 ml. quantity of inoculum of ·25% to 1% yolk-sac suspension having an initial egg infective titer of 7 $\log_{10}$ or more induces satisfactory antibody response with minimal reaction.

" 3. Although CF antibody usually wanes within a year, in most cases neutralizing antibody persists for at least 5 and one-half years.

" 4. That the duration of immunity is at least 5 and one-half years is also attested by the ability of persons truly immunized with strain E to resist challenge with virulent typhus rickettsiae.

" 5. That it is feasible to use the live vaccine under other than laboratory conditions was shown by rather extensive usage in field trials in Peru."

[See this *Bulletin*, 1958, v. 55, 492 *bis*.]

Weyer, F. Übertragung mehrerer Stämme von *Rickettsia tsutsugamushi* auf Kleiderläuse. [**Maintenance of Various Strains of *Rickettsia tsutsugamushi* in Body Lice**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1958, v. 9, No. 1, 42–53, 4 figs. [11 refs.]

The English summary appended to the paper is as follows:—

"In the course of a study on maintenance of rickettsiae in lice, 22 series of human body lice (each series consisting of at least 25 specimens) were rectally inoculated—while in the case of 66 series the inoculum was introduced into the coelom liquid—with 1 strain of *Rickettsia tamiyai* from Japan and the following strains of *R. tsutsugamushi*: Karp strain from New Guinea; Gilliam strain from Malaya; 1 strain from Korea; 2 strains from Japan (Kato and Hokkaido).

"In all cases the hemolymph of lice proved to be a suitable medium, and the rickettsiae multiplied, sometimes even very intensively. Reproduction was mainly extracellular, and the rickettsiae remained confined to the hemolymph, showing no affinity to any organs.

"By sub-inoculation of hemolymph containing rickettsiae the strains could be maintained by serial passages in lice for long periods. In spite of heavy infections the lice were not visibly affected by the rickettsiae. Continuous maintenance of rickettsiae in lice did not affect virulence or pathogenity of the parasites for mice.

"Examination of rectally inoculated lice revealed that stomach cells were never infected. In the few cases where rickettsiae could be found in lice they were confined to the hemolymph.

"It is concluded that the apparently lacking viability of rickettsiae in the cells of the digestive tract of body lice is not typical for certain strains, but a general characteristic of *R. tsutsugamushi*. Hence, *R. tsutsugamushi* occupies an exceptional position among the rickettsiae pathogenic for man.

"As experiments with the strain of *R. tamiyai* yielded exactly the same results as described for *R. tsutsugamushi*, it seems doubtful whether *R. tamiyai* can be regarded as a true species.

"Furthermore, maintenance of rickettsiae in mealworms (*Tenebrio molitor*) and ticks (*Ornithodorus moubata*) was studied. The rickettsiae were still found alive after 21 days, 25 days respectively."

[See this *Bulletin*, 1954, v. 51, 165; 1955, v. 52, 28.]

Harshman, S., Johnson, J. & Price, W. H. **The Effect of Red Blood Cells on Experimental Infection of White Rats with the R Strain of *Rickettsia rickettsii*.** *Amer. J. Hyg.* 1958, Jan., v. 67, No. 1, 109–17, 2 figs.

White Wistar rats inoculated intraperitoneally with 10^4 egg LD50 of *Rickettsia rickettsi* (R strain) showed no sign of clinical infection,

rickettsiae being undetectable in tissues after the fourth or fifth day. Daily intraperitoneal injections of 2 ml. of guineapig blood after inoculation with rickettsiae led to generalized infection. This effect was produced by injecting rats with blood from species resistant to *R. rickettsi* (horse, sheep, cow, rat) as well as with blood from susceptible species (guineapig, rabbit, man). Rats infected by the intracardiac or subcutaneous route and given daily intraperitoneal injections of blood developed significant rickettsial titres in the spleen but not in the tunica testis. There was no evidence that rickettsiae multiplying in rats which received blood injections differed in virulence from those in the original stock suspensions. Infections did not develop in rats which were given intraperitoneal injections of testis, spleen or brain suspensions instead of blood.

The factor in blood which promoted infection in rats was destroyed by heating to 100°C. for 5 minutes, or by lysing packed cells with distilled water, or by osmotic shock; it was not affected by freeze-thaw lysis or by lyophilization. It was not dialysable, and was present in the supernatant fluid after centrifuging freeze-thaw lysed cells at 30,000 g. for 1 hour.

These results confirm observations reported by Travassos in 1938 [this *Bulletin*, 1938, v. 35, 786]. *R. S. F. Hennessey*

Buşila, V. T., Bacila, E., Roşiu, L., Topciu, V., Barbulescu, L. & Damian, I. Contribuţii la epidemiologia febrei "Q". [**Epidemiology of Q Fever**] *Studii şi Cercetări Inframicrobiol., Microbiol. şi Parazitol.*, 1956, July–Dec., v. 7, Nos. 3/4, 295–301. French summary.

The following is a translation of the authors' summary:—

The authors present data on an epidemic of Q fever in which 43 cases were recorded in 3 weeks. It appeared in an agricultural undertaking in March–April 1952.

The aetiological diagnosis was confirmed by guineapig inoculation and the serological diagnosis was established retrospectively at the Dr. Cantacuzino Institute.

From the epidemiological studies and analysis of correlated data it can be concluded that transmission of the infection was principally airborne, by inhalation of dust from manure and from wool, which was a vehicle for the rickettsiae. The epizootic did not become fully established in sheep; after 2 weeks, the epidemic of Q fever in man followed.

The disease appeared to be of an occupational nature, directly related to the place of work. The fact that it attacked shepherds, cow herds and persons of 50 to 60 years or more suggests that this infection is of recent appearance in Rumania. *H. J. O'D. Burke-Gaffney*

Zarnea, G., Vasiliu, V., Voiculescu, R., Israel, H., Perederi, S., Tunaru, C., Szégli, L., Popescu, F. & Ionescu, H. Studiul unui focar de febră Q, avînd ca sursă de infecție cabalinele. [**Study of a Focus of "Q" Fever having an Equine Source of Infection**] *Microbiol., Parazitol. și Epidemiol.* Bucharest. 1957, Sept.–Oct., v. 2, No. 5, 443–50, 4 figs.

In March 1956, 2 cases of Q fever occurred among workers in a stables in the region of Constanța, Rumania. The diagnosis was confirmed serologically and by the isolation of *Rickettsia burneti* in guineapigs inoculated with blood taken from the patients on the 6th and 10th days of illness respectively. Complement-fixing antibody was present in titres of 32–1024 in 4 of 9 other persons engaged in the same work, and in titres of 8–16 in 5 of 24 horses. *D. J. Bauer*

Combiesco, D. Fièvre "Q" (typhus pulmonaire—rickettsiose pulmonaire). [**Q Fever (Pulmonary Typhus, Pulmonary Rickettsiosis)**] *Arch. Roumaines Path. Expér. et Microbiol.* 1957, Mar., v. 16, No. 1, 37–55. [31 refs.]

This paper describes the clinical features of Q fever as seen in Rumania, where the disease occurs among leather workers, sheep shearers, workers in stables, dairies and abattoirs, and other persons whose occupations bring them into contact with animals or animal excreta. The designation "pulmonary typhus" is favoured because of the frequency of lung involvement.

An account [without experimental data] is given of work which showed that *Rickettsia burneti* was present in the urine and faeces of infected guineapigs, and that the infection could be transmitted to guineapigs by inhalation, ingestion, or application of the organisms to the shaved skin or conjunctiva. The infection was also transmissible to the guineapig foetus via the placenta and to sucklings (guineapig, goat, sheep) by the milk of infected animals.

Infection with *R. burneti* was induced in guineapigs by inoculation of [? suspensions of] "*Hypobosca equina*" [? *Hippobosca equina*] collected from horses, *Melophagus ovinus* from sheep and *Rhipicephalus sanguineus* from dogs.

It is concluded that Q fever in man may result from inhalation of dust containing *R. burneti* derived from the dried excreta of infected animals or arthropods. Infection by ingestion of milk is also likely, particularly if the milk is fresh; the use of milk which has been allowed to undergo acidification (*e.g.* yoghourt) is less hazardous, the organisms being destroyed in less than 24 hours under these conditions. Transmission by the cutaneous and conjunctival routes is probable. The part played by arthropods has still to be clarified. *R. S. F. Hennessey*

Ende, N. & Gelpi, A. P. **Pathological Changes noted in Bone Marrow in a Case of Q Fever.** *Arch. Intern. Med.* 1957, Nov., v. 100, No. 5, 793–6, 4 figs. [12 refs.]

"A case of Q fever is presented in which an angiitis was found in the bone marrow which was consistent with some of the vascular changes described in other rickettsial diseases. Although the possibility exists that these findings may be coincidental, extensive studies on this particular case failed to reveal any other disease except Q fever.

"It is suggested that histological sections of bone marrow aspiration material may lend additional information to the knowledge of Q fever and other rickettsial diseases."

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

Boshell M., J. & Bevier, G. A. **Yellow Fever in the Lower Motagua Valley, Guatemala.** *Amer. J. Trop. Med. & Hyg.* 1958, Jan., v. 7, No. 1, 25–35, 3 figs. [15 refs.]

The wave of yellow fever infection spreading through Central America between 1950 and 1954 halted in August 1954 east of the Ulua Valley in Honduras. Reports of widespread deaths of monkeys in the Lower Motagua Valley in Guatemala, received in January 1956, showed that the first deaths of monkeys had occurred here, near the Honduras border, at the end of October 1955, and that the infection was resuming its course, having survived an unusually prolonged and severe dry season from October 1954 to July 1955 [see also this *Bulletin*, 1957, v. 54, 417 and 1172]. Widespread destruction of the forest along the Ulua Valley had led some observers to believe that this part of the Guatemala–Honduras border might have been an obstacle to the wave of infection, but it appears to have penetrated into Guatemala through a remnant strip of forest containing *Haemagogus equinus* and *Sabethes chloropterus*, and the monkey *Alouatta*.

In the Motagua Valley only two genera of monkeys were present, *Ateles* and *Alouatta*, both of which are poorly resistant to infection. The genus *Cebus*, which survives infection with yellow fever, does not extend into Guatemala; its most northern and western limits are north-west Honduras. At the end of the epidemic in Guatemala the primate population appears to have been wiped out and "people in the valley cannot remember when they last heard the familiar howling concerts" of *Alouatta*.

It is suggested that the two species of *Haemagogus* present, *H. mesodentatus* and *H. equinus*, are more strictly arboreal than *H. spegazzinii*, and that this may account for the rarity of human infection in areas outside the range of *H. spegazzinii*. One of the peculiarities of this area was the decrease in the population of *Haemagogus*, which began in July and August before the end of the rainy season. This decrease appeared to be independent of rainfall and temperature, and might be associated with the decrease in daylight hours at this time. Yellow fever virus was isolated from both species of *Haemagogus*, and also from *Sabethes chloropterus*. *H. mesodentatus* is believed to be the principal vector, as 14 out of 21 isolations of yellow fever were obtained from this species, 3 from *H. equinus*, and 4 from *Sabethes* [see also *ibid.*, 1957, v. 54, 1310].

By September 1956 the epidemic had extended to the north of Lake Izabal, and, in an addendum to the paper, the authors report evidence of virus from monkeys dying in the forests of the Salinas River, S.W. Petén, on the Guatemalan-Mexican border, in February 1957, and in May 1957 near Lake Petén, and in El Cayo, British Honduras.

B. R. Laurence

DENGUE AND ALLIED FEVERS

Pierrou, M. Le signe des trois doigts dans la fièvre de trois jours (fièvre à phlébotomes). [**The "Sign of Three Fingers" in 3-Day (Phlebotomus) Fever**] *Bull. Soc. Path. Exot.* 1957, May–June, v. 50, No. 3, 408–11.

In the summer of 1946 an outbreak of phlebotomus fever occurred among French troops in Tunisia. The presenting complaint commonly was of pain in the eyes or inability to move the eyes. A comparison was therefore made of the reaction to pressure on the globes of the eyes of patients with phlebotomus fever and of others with various infectious diseases. Pain in the eyes was never induced by light pressure except in phlebotomus fever, though it is stated that patients with dengue fever were not available for study. In exerting this light pressure 3 fingers of one hand are separately placed on the eye—the lids being closed—the thumb and the little finger automatically bending towards the palm of the examining hand. The middle finger is lifted a little and reapplied with slight pressure directed towards the lower portion of the eye anteriorly.

The procedure has been named "the sign of three fingers" in 3-day fever and has been described in order to direct the attention of young doctors to the diagnostic importance of ocular pain in the disease.

A. W. Woodruff

RABIES

Petzelt, K. & Steiniger, F. Kleinsäugetiere und Tollwut. [**Small Mammals and Rabies**] *Desinfektion u. Gesundheitswesen.* 1958, Feb., v. 50, No. 2, 17–22, 3 figs. [22 refs.]

The spread of rabies infection in Germany from east to west in the post-war period has been described in a number of publications [see this *Bulletin*, 1958, v. 55, 497; 647]. This paper again examines this spread and gives maps to show its extent in the years 1950–57. Rabies has, during this period, affected mainly wild mammals and birds. It was suggested by some observers that the heavy mortalities which occur among rats and field mice from time to time might be due to rabies infection, in part at any rate. Such small creatures might be acting as reservoirs of infection to the larger animals in which hitherto most of the cases of rabies have been proved by laboratory investigations. To test this possibility further the State Veterinary Institute in Brunswick made a number of examinations (128) of small mammals, mainly field mice, wood mice, house mice, other mouse types and a few shrews. It was found that 3·12% of the examinations were positive, but most of these were in house mice and since these were derived from an area in which the infection had already occurred in larger wild animals, no evidence was provided for the hypothesis that mice might be reservoirs of infection persisting in uninfected areas.

There follows a discussion of the observation that countries on or near the Atlantic seaboard are free or relatively free from rabies infection, a phenomenon in which climatic factors may play a part.

Finally there is some account, with quotations from the literature, of the role of other small animals, particularly blood-sucking and other bats, in the spread of rabies infection. *M. E. Delafield*

Chadli, A. Recrudescence de la rage en Tunisie. [**Recrudescence of Rabies in Tunisia**] *Arch. Inst. Pasteur de Tunis.* 1958, Mar., v. 35, No. 1, 61–4, 1 pl.

Although rabies has disappeared from Metropolitan France, there is in Tunisia a disquieting increase in the number of persons bitten by suspect animals and who attend for treatment at the Pasteur Institute there. A table shows, for each quarter of the year, the number of suspect animals examined for Negri bodies and the numbers found positive in 1955 to 1957 and the first 2 months of 1958. Of 33, 60, 61 and 34 animals (mostly dogs), 15, 22, 29 and 25 were positive. The author notes the high figure for early 1958, which was anticipated by that of 12 out of 18 dogs positive for rabies in the last quarter of 1957.

The official measures of control follow the usual line—vaccination for all persons bitten by suspect animals and various legal and practical measures applied to dogs and other susceptible animals.

While one could attribute the increase in the numbers of those attending the Pasteur Institute in Tunisia for treatment to an awareness of the disease and its dangers, the author feels that it is explained more realistically by the evidence of increase in the numbers of rabid biting animals.

It is not enough, he rightly points out, to lay down rules for prophylaxis: they must be implemented. It can be said that rabies flourishes only where the administrations tolerate it and *qu'un pays a la rage qu'il mérite.* *H. J. O'D. Burke-Gaffney*

Scatozza, F. & Castrucci, G. Il frazionamento dei constituenti cellulari applicato alla ricerca del virus fisso della rabbia. Nota II.— Comportamento delle frazioni nucleare e citoplasmatica nel corso dell' infezione sperimentale del coniglio. [**The Fractionation of Cellular Components applied to the Study of Fixed Rabies Virus. II. Behaviour of Nuclear and Cytoplasmic Fractions during Experimental Infection in Rabbits**] *Giorn. di Microbiol.* Naples. 1957, July–Aug., v. 4, No. 1, 58–67, 1 fig. [32 refs.]

The English summary appended to the paper is as follows:—

"The authors study the behaviour of rabies fixed virus in the CNS of rabbits killed at intervals of 24 hours since the infection. For this purpose they use Schneider's (1948), fractionated centrifugalization method limiting the investigation to research the virus presence in the nuclear and cytoplasmic fractions. From the results obtained the authors derive that rabies fixed virus can be earlier evidenced (on the 3rd day since the infection) in the cytoplasmic fraction and later (on the 4th day since the infection) in the nuclear fraction too. They derive also that at the beginning of the paralytic symptoms the virus reaches similar titers in the two fractions under study thus confirming the results obtained on this subject by Cilli and Scatozza (1956).

"The authors reserve to themselves to accomplish further researches having the purpose to clean up the significance of the virus present in the nuclear fraction."

[See this *Bulletin*, 1957, v. 54, 811.]

Scatozza, F. & Castrucci, G. Il frazionamento dei constituenti cellulari applicato alla ricerca del virus fisso della rabbia. Nota III.— Comportamento dei mitocondri, dei microsomi e della frazione solubile nel corso dell'infezione sperimentale del coniglio. [**The Fractionation of Cellular Components applied to the Study of Fixed Rabies Virus. III. Behaviour of Mitochondria, Microsomes and Soluble Fraction during Experimental Infection in Rabbits**] *Giorn. di Microbiol.* Naples. 1957, July–Aug., v. 4, No. 1, 68–76, 1 fig.

The English summary appended to the paper is as follows:—

"The authors study the behaviour of rabies fixed virus in the various

components of cytoplasm isolated by fractionated centrifugalization from CNS of rabbits killed at intervals of 24 hours since the experimental infection until the beginning of paralytic symptoms.

"From the results obtained they conclude that the rabies fixed virus is demonstrable in the mitochondria and microsomes since the 4th day after infection. With regard to the soluble fraction, it appears only on the 6th day and reaches a titer lower than the above mentioned fractions."

Türkay, N. Une étude sur la durée de conservation du virus rabique fixe dans glicerine. [**Duration of Preservation of Fixed Rabies Virus in Glycerin**] *Türk Ijiyen ve Tecrübî Biyoloji Dergisi.* Ankara. 1957, v. 17, No. 3, 261. [Fuller version in Turkish 259–60.]

The author in Ankara used for this study the fixed rabies virus from the Pasteur Institute in its 1,057th passage. Pieces of bone marrow from rabbits which were killed after inoculation with this strain were kept in glycerin at 4°C. in the refrigerator. Every week a 1/10 emulsion of the pieces was given intracerebrally to 2 rabbits in doses of 0·1 and 0·2 cc.

A table shows that the virus retained its viability and virulence for 64 days. *H. J. O'D. Burke-Gaffney*

Türkay, N. Recherche sur la durée de conservation du pouvoir antigénique de vaccin antirabique preparé par la méthode de Semple. [**Duration of Preservation of Antigenic Power of Semple-Type Antirabic Vaccine**] *Türk Ijiyen ve Tecrübî Biyoloji Dergisi.* Ankara. 1957, v. 17, No. 3, 195. [Fuller version in Turkish 192–4. (17 refs.)]

The following is a translation of the author's summary:—

The table shows that vaccines kept for 6 to 8 months [at 4°C.] had not lost their antigenic activity and were capable of producing neutralizing antibodies. Vaccines kept for 9 to 13 months had little or no antigenic activity and were incapable of producing neutralizing antibodies.

H. J. O'D. Burke-Gaffney

Bull. World Health Organization. Geneva. 1957, v. 17, No. 6, 869–978. [Numerous refs.] **Virus Diseases—Rabies.**

The present issue of the *Bulletin*, largely devoted to recent developments in rabies research and prophylaxis, records in 7 papers the results of investigations based mainly on recommendations made by the WHO expert committee on rabies during its three sessions held between 1950

and 1956. The names of the authors and the titles of the papers they have contributed are listed below.

i. Fox, J. P., Koprowski, H., Conwell, D. P., Black, J. & Gelfand, H. M. *Study of Antirabies Immunization of Man. Observations with HEP Flury and Other Vaccines, with and without Hyperimmune Serum, in Primary and Recall Immunizations* (pp. 869–904).

ii. Sharpless, G. R., Black, J., Cox, H. R. & Ruegsegger, J. M. *Preliminary Observations in Primary Antirabies Immunization of Man with Different Types of High-Egg-Passage Flury Virus* (pp. 905–910).

iii. Atanasiu, P., Bahmanyar, M., Baltazard, M., Fox, J. P., Habel, K., Kaplan, M. M., Kissling, R. E., Komarov, A., Koprowski, H., Lépine, P., Pérez Gallardo, F. & Schaeffer, M. *Rabies Neutralizing Antibody Response to Different Schedules of Serum and Vaccine Inoculations in Non-Exposed Persons: Part II* (pp. 911–932).

iv. Habel, K. *Rabies Antiserum Interference with Antigenicity of Vaccine in Mice* (pp. 933–936).

v. Veeraraghavan, N. *Preparation of Lyophilized Rabies Street Virus Material from Infective Submaxillary Glands for Challenge Purposes* (pp. 937–942).

vi. Veeraraghavan, N., Balasubramanian, A. & Subrahmanyan, T. P. *Advances in Rabies Treatment. An Experimental Evaluation* (pp. 943–962).

vii. Pérez Gallardo, F., Zarzuelo E. & Kaplan, M. M. *Local Treatment of Wounds to Prevent Rabies* (pp. 963–978).

i. This paper summarizes the results of recent experimental studies on: (a) the antirabies immunization of man with HEP Flury, Harris-type and Semple-type vaccines given in different dosages; (b) the influence of hyperimmune serum on primary active response; and (c) the use of HEP Flury vaccine to re-stimulate immunity induced either by the same vaccine or by previous conventional Pasteur treatment. As regards (a): with respect to both the total percentage of inoculated persons responding and the level of neutralizing antibody produced, no course of Flury vaccine achieved results equivalent to those following 4 or more doses of Harris or Semple vaccine. In terms of rapidity of response, as measured by appearance of antibody by the 10th day after first inoculation, however, Harris and Semple vaccines proved somewhat inferior to the best courses of Flury vaccine, *i.e.*, inocula given with 5-day spacing: either 4 intradermal doses, each of 0·04–0·16 gm., or 4 intradermal doses, each of 0·08 gm., simultaneously with 4 intramuscular doses, each of 0·33 gm. As regards (b): the results of 3 experiments, 2 with Flury vaccine and 1 with Fermi vaccine, gave support to the previously expressed view that, while the presence of serum antibody may exert some suppressive effect on active antibody response, with vaccines of full potency such effect may be of little practical significance. As regards (c): restimulation of immunity by a booster dose of HEP Flury vaccine was studied in 64 experimentally immunized persons—62 with Flury vaccine and 2 with

Semple vaccine—and in 136 persons, who had previously received conventional Pasteur treatment. In both instances small intradermal inocula of 0·04–0·08 gm. proved as effective as larger intramuscular inocula of 2·0 gm. in recalling pre-existing immunity. Moreover, analysis of the data on previous recipients of conventional Pasteur treatment showed that antibody persists for at least 5 years after a single course and for 15 or more years after re-treatment; also that in persons with histories of such treatment within a period of 20 to 25 years a single booster dose of Flury vaccine could stimulate response antibody titres at least equivalent to those normally observed after a full primary course of conventional vaccine.

ii. The results obtained with 3 different types of HEP Flury vaccine are reported. Young embryo-, centrifuged-, and filtered-type vaccines were used for primary immunization of 201 persons, who each received 3 intracutaneous injections of 0·2 ml. at intervals of 5–7 days, and who had no rabies antibodies in their pre-vaccination sera. Of 52, who received young embryo vaccine, with a suckling mouse LD50 titre of $10^{5\cdot1}$, 33 (63·5%) showed antibody response in sera taken in the second month after vaccination, but in 10 the response was minimal. Of 149 persons, who had received young embryo-, centrifuged-, or filtered-type vaccines, with LD50 titres exceeding 10^6, however, 142 (95%) showed a detectable antibody response, and in only 6 was the response minimal. Of 46 sera, taken at random from a group of 79 persons, who had received centrifuged vaccine and had all responded, 3 had no detectable antibodies when diluted 1 in 4, 5 had titres in the 1 in 4 to 1 in 7 range and 37 in the 1 in 8 to 1 in 127 range, while 1 had a titre greater than 1 in 128. These titres compare with those observed after 3 subcutaneous injections of Semple-type vaccine. The foregoing results confirm the view that the response to HEP Flury vaccine is directly related to its virus content. Finally it is noteworthy that neither in virus content nor in the elicited antibody response was the costly vaccine prepared from young embryos superior to centrifuged vaccine.

iii. Groups of adult human volunteers, with no previous history of exposure to rabies, were inoculated with different schedules of phenolized vaccine given subcutaneously and HEP Flury vaccine given intradermally, with and without inoculation of hyperimmune serum. Serum specimens of those inoculated were examined for antibody up to the 60th day after the first inoculation. The effect of booster doses of HEP Flury vaccine given 6 months after preparatory inoculation was also studied. Results showed that 3 doses of phenolized vaccine at 5-day intervals gave an antibody response quantitatively inferior to that following 14 daily doses of the same vaccine. 1 or 2 doses of serum almost wholly suppressed demonstrable active antibody response to 3 doses of phenolized vaccine given 5 days apart. 1 dose of serum had little or no suppressive effect on active antibody response to 14 daily doses of phenolized vaccine, but 2 doses of serum on the 1st and 5th days of treatment definitely

interfered with active antibody production. 3 intradermal doses of HEP Flury vaccine given 5 days apart evoked a low level of antibody response, but persons so inoculated responded promptly and effectively in producing antibodies to a later booster dose of the same vaccine. Serum in 1 or 2 doses completely suppressed antibody response to 3 doses of HEP Flury vaccine and also prevented the preparation of the person to respond to a later booster dose of this vaccine.

iv. Studies on non-exposed human beings receiving various schedules of anti-rabies vaccine with and without an inoculation of hyperimmune serum have indicated that the presence of passive antibody administered early in the course of vaccine treatment may suppress the subsequent active antibody response of the person to the antigenic stimulus of the vaccine. This interference effect of serum on the antigenic action of phenolized vaccine has now been tested in mice, in which, of course, both antibody response and immunity to virus challenge are capable of simultaneous evaluation. Results showed that the interference effect of serum is a true phenomenon, which could be quantitatively demonstrated in these animals, and that the interference with active antibody response to vaccine was paralleled by an interference with the production of resistance to virus challenge. Booster doses of vaccine given after the 10th day of treatment may, however, overcome this interference.

v. A method is described for the preparation of freeze-dried challenge virus from the submaxillary glands of dogs infected, experimentally or in nature, with rabies street virus. Immediately after the death of the dog, the glands are removed, freed as much as possible from fibrous tissue, finely minced and ground in a chilled mortar. A quantity of ice-cold inactivated 50% rabbit serum in distilled water containing 5% glucose, calculated to give a 10% final suspension of tissue is slowly added, grinding being continued the while. The suspension is then centrifuged and the supernatant pipetted out. Measured amounts of the supernatant are distributed into ampoules and freeze-dried without delay. By this method uniform suspensions are obtained which, on repeated titration, intracerebrally or peripherally, give regular and reproducible results.

vi. This paper records the results of an experimental evaluation of serum, vaccine, and sero-vaccine methods of anti-rabies treatment in guineapigs challenged with various strains of street virus: the American-derived NYC, which was mainly used, and the Indian Marimuthu and Masuli, which were used in some experiments. Anti-rabies serum alone, given before or after infection, while prolonging the incubation period, had no saving effect. Some protection was, however, obtained when serum, homologous to the particular strain of challenge virus, was employed. Doses of 5% Semple vaccine, comparable with those administered to human beings, conferred solid protection, provided treatment was started 7 days before challenge. Even when treatment began after infection, there was evidence of some (30%) survival among animals given vaccine corresponding to the human dosage in 14 instead of 7 doses.

Combined serum and phenolized vaccine thereafter against the NYC and Marimuthu strains was, when given after infection, of very considerable value under certain conditions. There appeared to be an optimum relationship between the quantity of serum given and the antigenicity and dosage of vaccine administered. HEP Flury vaccine administered before infection with the NYC and Marimuthu strains gave excellent protection, but combined post-infection treatment with serum and HEP Flury, while conferring 66% protection against the NYC strain, gave none against the Marimuthu.

vii. In this paper the authors review work already published on the local treatment of wounds against rabies and give the results of their own experiments on guineapigs, in which wounds produced in a hind leg and infected with street virus rabies were treated, after intervals of varying duration up to 24 hours, with nitric acid, detergent solution and anti-rabies serum, respectively. In the main experiments the method of wound infection was tearing of the skin and puncture of the underlying muscle with forceps dipped in 10% dog salivary gland suspension, followed by application of the suspension to the wound with a small paint brush. Nitric acid (concentrated, 70% w/w) was applied with cotton swabs or, so as to reach all pockets of the wound, with fine brush. The detergent, a commercial product called Terjolate, was applied by gentle swabbing or by fine brush. The hyperimmune serum, proved by a potency test in mice to be capable of neutralizing 300 LD50 of fixed virus, was infiltrated beneath the wound for local treatment or inoculated subcutaneously in the opposite leg for control purposes.

Results indicated a protective value of nitric acid up to 4 hours after infection and of serum, applied locally on systemically, up to the 24-hour time limit adopted. In this latter connexion, certain results strongly suggested that the serum could exert a specific local action. The detergent solution showed a protective effect up to 3 hours after infection, but this protection was considerably less than that achieved with nitric acid or serum. Finally, in 2 subsidiary experiments, the effect of hyaluronidase on the infectivity of the virus challenge suspension was studied; results showed that the addition of this substance—a diffusion factor in the saliva of carnivores—made little, if any, difference when the hyaluronidase-virus mixture was applied locally to the wound; there was, however, a trend towards greater pathogenicity when the mixture was injected intramuscularly. *G. Stuart*

Berke, Z. & Türkay, N. **The Problem of Seroprophylaxis in Rabies.** *Türk. Ijiyen ve Tecrübî Biyoloji Dergisi.* Ankara. 1957, v. 17, No. 3, 185–8. [Fuller version in Turkish 179–84.]

The authors have already reported [this *Bulletin*, 1956, v. 53, 744] that in guineapigs infected with street virus the best results were obtained

with serum-prophylaxis followed by a course of live (Högyes) or inactivated (Semple) vaccine. The object of the experiments now described was to determine the effect of serum applied locally to guineapigs at various intervals of time after their subcutaneous inoculation with the challenge virus.

In the first experiment, comprising 30 test animals arranged in groups of 5, each animal received 10 LD50 of virus; to 5 groups serum in a dosage of 2 ml. per animal was administered, by infiltration into the site of virus inoculation, 1 hour, 6 hours, 24 hours, 48 hours and 72 hours, respectively, after challenge; the sixth group served as untreated controls. Results showed that, while in the control group all 5 animals died of rabies in 8–12 days, in the treated groups all 25 remained alive during their 30-day observation period.

In the second experiment the protective value of serum with respect to both its time and method of application was investigated. To this end groups of guineapigs inoculated with 100 LD50 of virus received serum subcutaneously 6, 24, 48, 72, 96 and 120 hours, respectively, after challenge. At each of these time-intervals between virus and serum inoculation, 3 groups, each of 5 animals, were treated with serum: one with 2 ml. infiltrated around the site of virus inoculation; one with 2 ml. injected into a different area; and one with 1 ml. infiltrated around the virus-inoculated site and 1 ml. injected into a different area. Results showed that, whereas all the untreated control animals died in 8–12 days and whereas serum given by whatever method more than 48 hours after virus inoculation was ineffective, serum administered within 48 hours of virus challenge conferred definite protection: thus of 45 animals treated within this 48-hour period, 23 (51%) survived during their 30-day observation period. Results also suggested that the optimum method of treatment was to give one-half of the serum locally and the other half on the other side of the body. Finally it was noted that among the animals dying despite serum prophylaxis the incubation period varied from 7 to 17 days.

[In the post-infection treatment of guineapigs with serum given intramuscularly or subcutaneously within 24 hours of street virus challenge, Veeraraghavan *et al.* (see above) found that serum, while considerably prolonging the incubation period, had no saving effect. As regards mode of application to achieve optimum results, Pérez-Gallardo *et al.* (above) compared the protective effect obtained in guineapigs with serum applied, respectively, by infiltration under the wound and by inoculation, systemically, into the opposite leg, at 3- and 24-hour intervals after infection with street virus. By combining the results obtained from groups so treated at these time-intervals, it was found that 2 out of 10 animals died after local infiltration of 0·25 ml. of serum, contrasted with 10 out of 12 animals dying when the same quantity of serum was given in the opposite leg—a finding which suggested that the serum exerted a specific local action.] *G. Stuart*

Türkay, N. Recherches sur le pouvoir rabicide dans les sérums des sujets vaccinés par le vaccin Semple. [**Study of the Rabicidal Power of the Serum in Persons vaccinated with Semple Vaccine**] *Türk Ijiyen ve Tecrübî Biyoloji Dergisi.* Ankara. 1957, v. 17, No. 3, 236. [Fuller version in Turkish 234–6.] (14 refs.)

11 persons were bitten by a rabid wolf in the Tokat district of Turkey. All were treated with antirabies vaccine in the local hospital for up to 20 days. 2 patients developed rabies on the 17th day and a third on the 18th day. The 8 survivors were sent to Ankara where vaccination was continued for 10 more days. 26 days after the first injection their sera were examined for the presence of neutralizing antibodies by means of protection tests in rabbits. A table shows that antibodies were present in all. The patients were all well when seen 6 months later.

The author concludes that in persons severely bitten treatment should begin with antirabies serum; the 3 persons who died presumably succumbed before protective antibodies had developed.

H. J. O'D. Burke-Gaffney

Cajal, N. & Danescu-Popescu, G. Cercetări asupra imunizării antirabice la iepurii cu reactivitatea sistemului nervos central modificată. [**Studies on Anti-Rabies Immunization in Rabbits with a Modified Reaction in the Central Nervous System**] *Studii şi Cercetări Inframicrobiol., Microbiol. şi Parazitol.* 1956, July–Dec., v. 7, Nos. 3/4, 311–20, 2 figs. [18 refs.] French summary.

The following is a translation of the authors' summary:—

The authors have studied the process of immunization against rabies in rabbits the central nervous reactivity of which had been modified with different drugs. They report as follows.

Antirabic vaccination of rabbits carried out concurrently with the administration of benzedrine resulted in the development of specific resistance which was more marked than in the controls.

Such vaccination, together with the administration of medinal was followed by immunity weaker than that of the controls.

These differences were observed only when an active antirabies vaccine was used, suitably attenuated (Fermi vaccine).

These results confirm the view that antirabic vaccination causes a "minor" illness after which a state of specific resistance develops.

H. J. O'D. Burke-Gaffney

Stryszak, A. Właściwości ustalonego wirusa wścieklizny używanego do szczepień ochronnych psów w Polsce z uwzględnieniem jego roli w patogenezie porażeń poszczepiennych. [**The Properties of the Rabies Fixed Virus used for the Prophylactic Vaccination of Dogs in Poland with reference to its Role in the Pathogenesis of Postvaccination Paralysis**] *Przegląd Epidemiol.* Warsaw. 1958, v. 12, No. 1, 55–65. [13 refs.]

The English summary appended to the paper is as follows:—

"It has been demonstrated that the virus fixe of rabies used for the preparation of vaccines for dogs has preserved to a marked degree the ability to provoke diseases in dogs, rabbits, guineapigs, and mice after subcutaneous introduction into the organism. The virus fixe has not been ascertained in the saliva or salivary glands of guineapigs, sheep, or dogs infected subcutaneously or intracerebrally.

"Among the typical paralytic symptoms provoked by the inflammatory process in the brain or spinal cord of dogs and guineapigs which have died, Negri's bodies have not been found. Distinct neutrophilia and lymphopenia have been demonstrated in the peripheral blood of paralysed animals. Some of the sick animals also showed a rise in the blood sugar.

"The author is of the opinion that the principal role in the pathogenesis of postvaccination paralysis in dogs is played by the fixed virus contained in the vaccine. The virus concealed in the clumps in the nervous tissue may not be accessible to the inactivating effect of phenol."

Stryszak, A. Wpływ szczepień ochronnych psów na występowanie w Polsce wścieklizny u zwierząt. [**The Influence of Prophylactic Vaccination of Dogs on the Incidence of Rabies in Animals in Poland**] *Przegląd Epidemiol.* Warsaw. 1958, v. 12, No. 1, 67–72, 1 fig.

The English summary appended to the paper is as follows:—

"The prophylactic vaccination of dogs has substantially contributed to the lessening of the menace of rabies in Poland. In order to overcome infection completely, an endeavour should be made to extend vaccination to all dogs, while unvaccinated dogs or strays should be liquidated. The considerable decrease in the intensity of rabies in Poland [from 3,744 cases in 1949 to 65 in 1956] has permitted a partial mitigation of the precautions applied to individuals bitten in districts free from rabies. In the choice of remedies, a well prepared epizootiological case-history may be helpful.

"The presence of toxic virus has not been demonstrated in the saliva of prophylactically vaccinated dogs. Such dogs therefore do not constitute a danger to humans, even when they contract postvaccination paralysis."

Shen, R. M., Orlova, N. N., Turevich, S. T., Nazarov, V. A. & Bezeliuk, M. I. **A Study of the Development of Antibody in Dogs vaccinated with Different Types of Rabies Vaccine.** *Problems of Virology.* London. 1957, v. 2, Nos. 3/4, 163–8. [10 refs.] [Translated from Russian.]

WELLS, C. W. **Rabies Control in Malaya, August 1952–October 1956.** *Bull. World Health Organization.* Geneva. 1957, v. 17, No. 6, 1025–9, 1 fig.

This note describes how in recent years eradication of rabies from Malaya was achieved and maintained. Rabies had been present at a substantial enzootic level in the northern half of the country since 1924, but in 1946 the disease began to spread, and by 1952 had reached the southern part of the State of Selangor, with a fulminating outbreak in the Federal capital of Kuala Lumpur. In Malaya the dog is the principal, if not the sole, vector of rabies, and prior to 1952 attempts at control measures had been confined to stray dog destruction and sporadic canine immunization campaigns. The situation in 1952, however, demanded more concentrated attack, backed by more stringent legislation. Plans for suppression of the epizootic and ultimately for eradication of rabies from the whole territory were implemented in successive stages, during which stray dog elimination was to be co-ordinated with mass vaccination and rules requiring vaccination were to be augmented by well-organized publicity campaigns, by means of every available publicity medium.

During 1952 compulsory vaccination of 17,900 dogs, 4 months old and above, with chicken embryo (Flury strain) vaccine, was carried out in the Kuala Lumpur area, and 12,200 dogs of similar age in the 4 most seriously infected areas of Perak were vaccinated with a Semple-type vaccine (a phenolized 20% buffalo-brain suspension). In 1953 an intensive mass vaccination of dogs with Flury vaccine was begun simultaneously in every rabies-infected State in the Federation; all dogs, 4 months old and above, irrespective of their previous vaccination history, were required to submit to vaccination. By the end of 1953, during which 73,694 dogs had been vaccinated, at least 80% of dogs in the infected States were estimated to be immune, and 60% of the total dog population of the Federation. Moreover there had been no case of confirmed canine rabies in the latter half of the year. 6 consecutive months of freedom, however, was too short a period on which to base an assumption that eradication had been effected and so, in order to smother any cryptic foci of infection and to consolidate earlier results, Pan-Federation compulsory vaccination with Flury vaccine of all dogs 3 months old and above was introduced in 1954. By the end of that year 115,100 dogs, irrespective of previous vaccination, had been vaccinated—a vaccination total not less than 85% of the total dog population of the country. During 1954 no case of canine rabies was reported.

Inasmuch as the country had remained free from rabies between July 1953 and December 1954, compulsory vaccination in 1955–56 was limited to dogs in the "immune belt"—a zone 50·80 km. wide along the Malayan side of the Thailand-Malaya border. Since the time when this measure was introduced to prevent possible introduction of the virus from rabies-infected southern Thailand, some 10,000 dogs in the zone had been

vaccinated. During this period 2 cases of canine rabies occurred, 1 each in October and November 1955, one in the immune zone and one in a dog probably smuggled across the border.

The occurrence of only 2 cases in over 3 years in a country with an average annual incidence of 112 laboratory confirmed canine cases from 1946 to 1951 and 198 cases in 1952 seems to confirm the view that rabies is no longer enzootic in Malaya.

[See also this *Bulletin*, 1955, v. 52, 1078.] *G. Stuart*

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

Mullett, C. F. **The Bubonic Plague and England. An Essay in the History of Preventive Medicine.** pp. vii + 401. 1956. Lexington: University of Kentucky Press. [63s.]

Girard, G. Caractères généraux des mutants pseudolysogènes sélectionnés chez *Pasteurella pestis* par les bactériophages. Déductions épidémiologiques. [**Characters of Pseudolysogenic Mutants Derived from** *Pasteurella pestis* **by Bacteriophages. Possible Epidemiological Significance**] *C.R. Soc. Biol.* 1957, v. 151, No. 6, 1068–71.

Pasteurella pestis cells grown in the presence of phage Y produced secondary colonies which appeared to be lysogenic; the liberated phage was active on all strains including the original strain. However, some of these colonies were themselves sensitive to phage Y and did not carry phage. The situation has been described as pseudolysogenicity (Jacob *et al.*, *Ann. Inst. Pasteur*, 1953, v. 84, 222) and occurs when phage and bacteria form a more or less stable equilibrium but one from which all the phage can be removed, by, for instance, phage antiserum. When deprived of free phage the secondary colonies were found to be resistant, not only to the phage they had carried but also to other phage. The mixed population of bacteria and phage was less pathogenic than the original *P. pestis*. When inoculated into mice and re-isolated the phage was lost. After a second passage the bacteria lost their resistance to phage, and after a series of passages displayed all the characters of normal *P. pestis*. Sometimes, *in vitro*, the equilibrium would break up spontaneously with opposite effect—the culture clearing and only phage being recovered.

The author suggests that phenomena like these might play a part in causing the irregular plague cycles which occur in areas where plague is endemic. Free bacilli may be attacked by phage dispersed in soil or water; especially since *P. pestis* is sensitive to Enterobacteriaceae phage.

Janice Taverne

Bacon, Marion, Bacon, Roma F. & Drake, C. H. **Bacterial Infections in Wild Rodents of Eastern and Central Washington.** *J. Infect. Dis.* 1958, Jan.–Feb., v. 102, No. 1, 5–13. [19 refs.]

———— & Drake, C. H. **Comparative Susceptibility of Various Species of Mice Native to Washington to Inoculation with Virulent Strains of *Pasteurella pestis*.** *Ibid.*, 14–22. [22 refs.]

Bacteriological examination of 898 rodents (17 species) and 23 shrews (2 species) collected in eastern and central Washington during the period 1953–56 yielded 1 strain of *Brucella bronchiseptica* and 1 strain of an organism resembling *Listeria monocytogenes* from tissues of *Microtus montanus* (the mountain vole). Neither *Pasteurella pestis* nor *Br. tularensis* was isolated, although sylvatic plague and tularaemia are known to have occurred within the area investigated. *Spirillum minus* was found in a smear of heart blood from one *Mus musculus* and trypanosomes resembling *Trypanosoma lewisi* were seen in the blood of one *Rattus norvegicus*.

The second paper describes experiments in which groups of wild mice common in eastern and central Washington were inoculated subcutaneously with dilutions of cultures of *P. pestis*. *Perognathus parvus* (the pocket mouse) was highly susceptible, the average survival time after inoculation being 2·9 days for 13 out of 14 mice. It is thought unlikely that this species could maintain enzootic plague; it " may have enzootic importance where other mammal species are present ". *Peromyscus maniculatus* (the deer mouse) and *M. montanus* showed varying degrees of susceptibility, some animals dying after doses of about 10 bacilli while others resisted doses of over 100,000 bacilli. Bacteraemia occurred in moribund mice of both species and it was concluded that they could play important roles in the ecology of plague. *R. S. F. Hennessey*

Kartman, L., Miles, V. I. & Prince, F. M. **Ecological Studies of Wild Rodent Plague in the San Francisco Bay Area of California. I. Introduction.** *Amer. J. Trop. Med. & Hyg.* 1958, Jan., v. 7, No. 1, 112–24, 3 figs. [34 refs.]

Urban plague has not been known in the United States since 1924, although wild rodent plague foci have been recorded in about 40% of the area. Between 1908 and 1951, 91 plague infections were recorded from seven Western states, and 57 of these were fatal. The principal reservoirs are believed to be prairie dogs, *Cynomys*, wood rats, *Neotoma*, and ground squirrels, *Citellus*. A human fatality, apparently from contact with ground squirrels, was recorded in 1956. An extermination campaign in one area against ground squirrels was followed by the discovery of plague in mice (*Microtus* and *Peromyscus*) and their fleas, and, in California, 12 genera of rodents and lagomorphs, or their fleas, have been associated with

plague. The most important human contacts with rodent plague are in the suburbs of towns, which progressively become less suitable for the rodent population, and in recreational areas.

This information is given in the first of a series of papers on studies initiated in 1954 in the San Francisco Bay area, which also describes the climate, vegetation and some survey methods. Future papers will describe the rodent and flea populations, the infection rate in fleas, and the susceptibility of rodents to plague. *B. R. Laurence*

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

COONOOR. **The Pasteur Institute of Southern India, Coonoor. Section B. Scientific Report 1957. VI. Cholera** [VEERARAGHAVAN, N., CHANDRASEKHAR, D. S. & VISALAKSHI, K. V. K.]. pp. 78–9. 1958. Madras: Diocesan Press.

"The results of these studies could be summarized as follows:

"i. Different strains of *V. cholerae* vary in their sensitivity to streptomycin *in vitro*.

"ii. It is possible to produce an enteric infection in guinea pigs under conditions described by Freter.

"iii. Equally good results could be obtained with much smaller doses of *V. cholerae*.

"iv. The infection is localised to the intestines and *V. cholerae* are not recoverable from the heart blood, liver and spleen."

[See also this *Bulletin*, 1956, v. 53, 50.]

BURROWS, W. & SCHLUB, Louise J. **Studies on Immunity to Asiatic Cholera. X. Heat Stable Cell Wall and Intracellular Antigens of *Vibrio cholerae* Independent of Agglutinogens and Demonstrable by Passive Hemagglutination.** *J. Infect. Dis.* 1958, Jan.–Feb., v. 102, No. 1, 94–101, 1 fig. [16 refs.]

Rabbit erythrocytes treated with tannic acid and sensitized with heat-stable soluble antigens derived from cell walls and intracellular material of 2 strains of *Vibrio cholerae* (Inaba and Ogawa serotypes) were agglutinated by antisera to both strains at titres of 1 in 10,000 to 1 in 60,000, these antisera having agglutinating titres of 1 in 5,000 for suspensions of the homologous vibrios. Absorption of the antisera with intact homologous vibrios reduced the bacterial agglutinin titres to 1 in 100 but

failed to reduce the haemagglutinating titres below 1 in 6,000. Titrations of the haemagglutination-inhibiting activity of the soluble antigens at varying concentrations of both antigen and antibody indicated that the cell-wall antigen was about 5 times more active than the intracellular antigen of the same serotype.

These results are taken as evidence that *V. cholerae* contains antigens distinct from O agglutinogens, cell walls and intracellular substance sharing antigenic specificity both within and between serotypes.

[For part IX in this series, see this *Bulletin*, 1958, v. 55, 507.]

R. S. F. Hennessey

Chatterjee, H. N., Ghosh, S. M., Chatterji, B. B., Chakravarty, H. K. & Ray, N. R. **A Study of Prothrombin Time and Thrombotic Phenomena in Cholera.** *Amer. J. Trop. Med. & Hyg.* 1958, Jan., v. 7, No. 1, 95–9. [14 refs.]

The authors, impressed by the marked tendency of the blood of cholera patients to clot in the syringe during withdrawal, estimated the prothrombin time in a series of 42 patients treated in hospital in Calcutta during an epidemic in 1955. On each patient estimations were made on admission, before attempts to restore the circulating volume had been initiated, at the time when clinical improvement is usually manifest (72–96 hours from onset), and during convalescence. The haematocrit and whole blood specific gravity were estimated concurrently. A Quick prothrombin time method was used, modified by the employment of a locally produced solution of Russell's viper venom as the thromboplastic agent, the dilution of which was standardized to coagulate fresh normal plasma in 25 seconds.

Case severity varied from moderately severe to severe, the patients showing a range of whole blood specific gravity from 1,064 to 1,072 [normal 1,056; usual range in acute cholera 1,063–1,068]. On admission the prothrombin time was decreased in every case, ranging from 17·9 seconds to 14·9 seconds (normal controls 25 seconds). This decrease in the prothrombin time was inversely related to the haematocrit and the blood specific gravity. With clinical improvement on restoration of the blood volume the prothrombin time returned to normal in all but 4 patients. In these, despite the normality of the haematocrit reading and of the specific gravity of the whole blood, marked dyspnoea with an increased respiratory rate persisted. It is suggested that in these patients pulmonary embolism was the complicating factor. [The authors, however, do not offer an opinion as to whether this might be the effect or the cause of the persistent elevation of the prothrombin concentration.]

During this epidemic, in which 1,800 patients were admitted with cholera, the authors observed 2 examples of femoral thrombosis, 4 of hemiplegia and 1 of double hemiplegia, together with a number of patients showing sustained dyspnoea despite the restoration of a normal blood

volume. In retrospect, it is considered possible that these were instances of pulmonary embolism.

[An admirably clear, concise paper.]

[See also Lahiri, this *Bulletin*, 1936, v. 33, 373.] *J. H. Walters*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

Shafei, A. Z. **The Relationship of Cancer of the Rectum to Intestinal Amoebiasis and Bilharziasis. A Case Report.** *J. Egyptian Med. Ass.* 1957, v. 40, No. 12, 856–9, 1 fig. on pl.

"In intestinal amoebiasis, proctoscopy may reveal the presence of excavated ulcerations with hard craggy margins suggesting a malignant nature, but its amoebic nature may be identified by biopsy and verified by healing after antiamoebic therapy, which was not the case in the present condition. Though pain in amoebic proctitis is a marked feature and may show an atypical radiation, yet its presence in this case denotes a rectal carcinoma. Its radiation is due to degeneration, ulceration, and endoneural and perineural invasion in the pelvis.

"The present case is considered to be of interest in that it is the first in which both long standing bilharziasis and amoebiasis coexist with rectal carcinoma. This coincidence cannot be left unrecorded, since the relationship of either condition to rectal carcinoma could be verified only after the evaluation of statistical records in the literature."

Ruiloba Benítez, J., Ortega, C. & Peña, J. C. Tratamiento de la amibiasis intestinal en el hombre con un nuevo amebicida: el Win-5047. (Comunicación preliminar.) [**Treatment of Intestinal Amoebiasis with Win-5047**] *Rev. Invest. Clín.* 1957, Oct.–Dec., v. 9, No. 4, 537–40.

The English summary appended to the paper is as follows:—

"1. Win-5047 was tried on 30 patients with intestinal amebiasis. Three of these had ulcerative procto-sigmoiditis; 21 had chronic amebic colitis and 6 were 'healthy carriers' with E. histolytica.

"2. After preliminary tests, the dose was established at 0·5 g. of Win-5047 t.i.d., after meals, during 10 consecutive days.

"3. One patient with procto-sigmoiditis, 16 with chronic colitis and 3 'healthy carriers' were cured.

"4. No toxic symptoms were registered. One half of the patients presented flatulence, which disappeared after the drug was discontinued."

[See this *Bulletin*, 1954, v. 51, 1064.]

Senecal, J., Larivière, M., Dupin, H. & Trenou, R. Quelques aspects des abcès amibiens du foie chez le nourrisson africain. [**Observations on Amoebic Abscess of the Liver in African Infants**] *Bull. Méd. de l'A.O.F.* Dakar. 1957, July–Sept., v. 2, No. 3, 349–55, 4 figs.

Amoebic involvement of the liver is very rare in infants. This is a record of 4 such cases seen in West Africans during a period of 4 years. The first patient was a boy of 3 years suffering from dysentery, fever, and an abscess in the epigastrium. No parasites were found in the stools; thick green pus aspirated from the abscess also failed to yield parasites. The child died and numerous amoebae are said to have been found in the walls of an abscess in the left lobe of the liver. The second was a girl aged 2 years with dysenteric diarrhoea, fever, and liver enlargement. The child died and a large abscess was found in the right lobe of the liver; 4-nucleated cysts [*sic*] are said to have been found in the abscess contents. The third was a female child of 6 months with fever and dyspnoea. There was a very considerable liver enlargement thought to be due to a pyogenic abscess. This child also died and on autopsy a large right lobe abscess was found to be full of yellowish pus. Numerous amoebae were identified in the liver tissue. The fourth was a boy of 2 years with a large tumour in the right flank, and a considerable firm liver enlargement. Liver puncture yielded a non-foetid chocolate-coloured matter in which non-haematophagous amoebae were seen. The stools contained a few haematophagous amoebae. Under repeated aspirations and treatment with antibiotics injected into the abscess cavity as well as being given by more usual routes, the child eventually recovered.

[The identification of " 4-nucleated cysts " in an amoebic abscess cavity must inevitably raise very serious doubts on the correctness of the parasitic diagnosis in these cases.] *A. R. D. Adams*

de Carneri, I. *Entamoeba invadens* Rodhain, 1934, ed *Entamoeba histolytica* Schaudinn, 1903; studio comparato della sensibilità *in vitro* a 16 farmaci, e problemi connessi con l'uso della prima come modello per ricerche di chemioterapia dell'amebiasi. [**Comparative Study on the Response of** *Entamoeba invadens* **and** *E. histolytica* **to** *in vitro* **Action of 16 Drugs, and its Bearing on the Use of the Former Species for Chemotherapeutic Researches in Amoebiasis**] *Riv. di Parassit.* Rome. 1957, July, v. 18, No. 3, 133–53. [Numerous refs.] English summary.

The author carried out *in vitro* tests of the amoebicidal action of 16 antibiotic and chemotherapeutic drugs against *Entamoeba invadens* grown at 26°C. and *E. histolytica* grown at 37°C. In general it was found that the two amoebae showed a similar response, differing mainly in the longer time and lower dilution required to produce the desired effect in the case of the reptilian parasite. This difference is attributed to the lower temperature at which it is cultivated and its slower growth in culture.

The tests are described and tabulated in detail. It was found that dihydrostreptomycin, penicillin, erythromycin, and bacitracin had no appreciable amoebicidal action, while that of the two optical isomers of chloramphenicol was weak. Among other drugs, some (chlorotetracycline, pyrimethamine, Trichomycin) manifested a rapid lethal effect, whereas others (Yatren, chloroquine, carbarsone, oxytetracycline, tetracycline) required several hours to produce the same effect. As regards the remaining two compounds (fumagillin, emetine), their action on *E. histolytica* is revealed after 24–30 hours, and on *E. invadens* after 4–6 days.

Since the compounds tested had a similar effect on the two amoebae, it is suggested that the reptilian parasite is a suitable test organism for screening amoebicidal drugs. *C. A. Hoare*

Fancher, O. E., Hayao, S. & Nichols, G. **Some New Amebicidal Diamines.** *J. Amer. Chem. Soc.* 1958, Mar. 20, v. 80, No. 6, 1451–6. [Refs. in footnotes.]

"A number of bis-aminoalkanes and the related bis-tetrahydro-1-isoquinolylalkanes have been prepared for testing as amebicidal and trypanocidal agents. Some of these compounds showed sufficient activity *in vitro* to warrant *in vivo* and clinical study."

RELAPSING FEVER AND OTHER SPIROCHAETOSES

Galliard, H., Lapierre, J. & Rousset, J. J. Essai de classification des *Borrelia* par leur pouvoir protecteur contre *Trypanosoma brucei* chez la souris. (Note préliminaire.) [**An Attempt to Classify Spirochaetes by their Protective Power against** *Trypanosoma brucei* **in Mice**] *Bull. Soc. Path. Exot.* 1957, Sept.–Oct., v. 50, No. 5, 663–6.

The authors have re-examined the prolongation of life which has been recorded in mixed infections of trypanosomes and spirochaetes [see Galliard, this *Bulletin*, 1929, v. 26, 126] in order to see whether different spirochaetes varied in their protective properties. Mice were infected with various strains of spirochaetes and subsequently, either on the fourth day or at the height of infection, with a drop of blood from a mouse infected with *Trypanosoma brucei*. The results indicate that spirochaetes can be divided into two definite groups—the *duttoni-meriones* group in which there is a long survival or even recovery, and the *hispano-persica* group which does not confer any protection. *S. turicatae* is intermediate in its properties, sometimes having no obvious effect and in other cases lengthening the survival period. These results agree with the grouping of these spirochaetes arrived at by other methods.

The details of the results are given in the following table:—

Strain of Spirochaete	*Number of mice*	*Duration of survival*
duttoni	11	18 to 56 days
microti I	3	25 to 33 ,,
microti II	5	21 to 30 ,,
microti III	5	14 to 23 ,,
hispanica normal	6	6 to 10 ,,
hispanica virulent	5	9 to 13 ,,
persica	11	5 to 7 ,,
turicatae	13	7 to 25 ,,

Edward Hindle

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Nelson, G. S. **Leprosy in the West Nile District of Uganda: an Epidemiological Study with special reference to the Distribution of Leprosy in Africa.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1958, Mar., v. 52, No. 2, 176–85, 2 maps. [33 refs.]

Following on a report by the interterritorial leprologist of an incidence of 118 per thousand of leprosy in the West Nile District of Uganda, the author examined 21,256 persons in 19 villages. The incidence in the villages varied from 0·6 to 53·3 per 1,000, and it is now believed that there are fewer than 5,000 cases in the District.

When the 266 cases found were divided into 5-year and 10-year age-groups, it was found that the number under 15 years was 18·4%, and the highest number in any group was 56 in the 21–30 period. Classification showed 18·4% lepromatous, 72·6% tuberculoid, and 9·0% indeterminate. A map shows the incidence in the 11 West Nile counties and emphasizes the division of the District into 2 areas, one with less, and the other with more, than 10 per 1,000. The former is above the escarpment at an altitude of 4,000 to 6,000 ft., with 50 to 70 in. rainfall, density of population per sq. mile of 118·9, and an incidence of leprosy of 6·2 per 1,000. The latter is below the escarpment at an altitude of 2,000 to 4,000 ft., with 30 to 50 in. rainfall, density of population per sq. mile of 36·6, and an incidence of leprosy of 19·4 per 1,000. These figures would suggest that high rainfall and dense population are not causes of high incidence. The question of the effects of tuberculosis on the incidence of leprosy is discussed with reference to the literature.

Lastly, two questions are asked: " Why is leprosy so prevalent in the

heart of Africa ? " and " Why is the incidence of leprosy in West Nile so much higher below than above 4,000 feet ? " The answer to the first question is that the effects of civilization have been felt least in the most primitive major region of the world. The answer to the second is that in the lower region " the most scattered population is more primitive and has had the least contact with the influences of civilization; it is possible that here where tuberculosis is uncommon the people are most susceptible to leprosy." *Ernest Muir*

Bhattathiripad, T. N. N. **Infectivity of Non-Lepromatous Leprosy.** *Leprosy in India.* 1957, Apr., v. 29, No. 2, 39–43.

Out of 529 cases of leprosy a history of contact was given by only 88. " The number that has acted as infectors is still less (72). This is calculated on the following basis. If there are more than one case in a family, the one that gives the longest history of duration is taken as the infector irrespective of the type to which he belongs. Thus if in a family of six members there is a N. case with a history of 10 years' duration and a L. case with a history of only 2 years' duration, the former is taken as the infector as it is obvious that the latter could not have infected the former." From such reasoning it is concluded that: " Non-lepromatous cases are not benign in the real sense of the term, as 11·25% of these cases have passed on the infection to their contacts ". Two examples are given to illustrate the author's thesis, though no bacteriological examination could be done at the time of detection. The author feels personally " that it is better to wait till all signs of activity subside in a given case before a certificate is issued ". An apology is made, however, " that my own experience in the field of leprosy is limited to a couple of years or so and I quite realise that I have no right to speak with any authority on the subject ". *Ernest Muir*

Davey, T. F., Drewett, S. E. & Stone, Cynthia. **Tuberculin and Lepromin Sensitivity in E. Nigeria.** *Leprosy Review.* 1958, Apr., v. 29, No. 2, 81–101, 7 figs. [16 refs.]

This paper is in extension of previous publications of work done at Uzuakoli by Lowe and McNulty [this *Bulletin*, 1953, v. 50, 948], Lowe and Davey [*ibid.*, 1957, v. 54, 1194] and Lowe and McFadzean [*ibid.*, 49]. Larger groups and a wider range of age and locality are used in this work, and the experiments are divided into 2 parts.

In the first part tuberculin and lepromin reactions are noted in school-children. 6 schools were chosen, one in a rapidly developing township and the others in rural areas at varying distances from the lines of communication. Tuberculin (10 TU) and lepromin tests were carried out in a total of 3,062 children. It is shown in tabular form that the positive tuberculin rate at the urban school is higher than in the Medical Research

Council tuberculin survey in England for corresponding age-groups. In the rural schools tuberculin sensitivity was lower, and less in proportion as contact with townships decreased. The Mitsuda (late reading) reactions were high in the town school and in one of the rural schools, but low in the other rural schools. The proportion of those with a positive Mitsuda reaction who are positive to the Fernandez reaction is generally 55% in adults and 25% in children; but in these schools, the proportion of positive Fernandez reactions was much smaller.

The degree of sensitivity to tuberculin and lepromin (Mitsuda) at different age-groups in the 5 schools is shown in tabular form. Although higher levels of sensitivity to Mitsuda are found in localities where leprosy has been rife in the past, it is very unlikely that here or elsewhere infection with *M. leprae* is alone responsible for the actual high levels found among children at the present time. At every school the findings indicate a relationship between tuberculin and lepromin sensitivity: ". . . in both urban and rural areas tuberculin and lepromin sensitivity tend to be associated in the same individuals. In urban areas it is possible that tuberculosis infection is responsible for this to a small extent, but in rural areas where tuberculosis is at a lower level it is impossible to find any evidence that it is having any appreciable influence on lepromin sensitivity. In some localities it is very doubtful that *M. leprae* could itself be responsible for the level of lepromin sensitivity seen in young children and here at least it is probable that geographical and constitutional factors are influencing the situation."

The second part of the paper describes work in a group of 4 associated villages with a combined population of about 2,500, the same villages as those from which the children had been drawn who attended one of the schools above. Leprosy had once been rife, and as repeated surveys had formerly been made the people could be relied upon for cooperation, and findings could be related to the well known incidence and trend of clinical leprosy. Here again similar results were obtained to those given by the examination of the schoolchildren. No evidence could be found in rural areas, where tuberculosis was at a low level, that tuberculin sensitivity was having any appreciable influence on lepromin sensitivity during the years of childhood, in spite of the fact that the two sensitivities tended to be associated, both in their occurrence in the same persons and in their intensity. *Ernest Muir*

Leprología. Buenos Aires. 1956, July–Dec., v. 1, No. 2, 117–90, illustrated. [Numerous refs.] French summaries. Relaciones inmunologicas entre lepra y tuberculosis. [**Immunological Relations between Leprosy and Tuberculosis.**]

In addition to the editorial by E. D. L. Jonquières there are 10 contributions to this symposium on the relationship of the two diseases. The

editorial argues that in using BCG vaccination to strengthen resistance to leprosy it is better to vaccinate only those subjects who show a negative reaction to lepromin. One difficulty, especially in rural areas, is the survival alive of BCG for only a few days, and the question is discussed of strengthening BCG by the use of irradiated tuberculosis vaccine. Another difficulty is in carrying out lepromin and tuberculin tests first, and giving BCG only in those who are negative to both these tests.

J. M. M. Fernández (p. 122) writes on BCG in the prophylaxis of leprosy. He describes a field plan for its use in Argentina, the total population of the affected areas being included. All the contacts are divided into two groups according to whether or not they have had intradermal injections of lepromin. Of each group 50% are inoculated with BCG. He stresses the need for an international commission to determine the best method of use and dosage of BCG; and in the meantime a commission of the Argentina Leprosy Association should study the relative values of oral and parenteral administration. In this study oral administration would be reserved for the areas nearer the centre, the more distant areas receiving injections.

The next paper by N. O. Castro, E. Zamudio and P. B. Arcuri (p. 128) discusses further the plan of campaign with BCG vaccination. They found that in people who had not been in contact with leprosy intradermal vaccination gave 81·2% of conversions of lepromin negatives to positive, compared with 51·2% when BCG was given orally. They recommend that BCG should be given intradermally to all new-born children in endemic areas, and the same to people with negative tuberculin and lepromin reaction; but that if the Mantoux is positive and the lepromin negative BCG should be given orally.

N. D. Aramburu, H. J. S. Caballero, J. M. P. Carrera and E. T. Capurro (p. 138) write of three groups of healthy contacts with leprous patients who were given respectively: 100 mgm. of BCG by injection each week for 3 weeks, 200 mgm. each week for the same period, and 200 mgm. each week for 4 weeks. There was no significant difference in the percentages of conversions (68·4, 45·0 and 54·2%, respectively).

Conjugal leprosy infection is discussed by G. Basombrío, J. E. Cardama and J. C. Gatti (p. 141). Of 1,380 registered patients 839 married patients were examined, but it was possible to examine only 272 married couples. Of these, in each of 260 couples there was only one partner affected with leprosy. Of the 12 couples in which both partners were affected only in 1 case had the infection acquired from the other partner been of the lepromatous type; 8 of them were tuberculoid and 3 undetermined. The infecting partner's disease was always of the lepromatous type; 7 of them were females and 5 males. The percentage of conjugal leprosy among the 1,380 patients was 4·41.

The Fernandez reaction with total protein lepromin is discussed by N. O. Castro and P. B. Arcuri (p. 143). In non-contacts with leprosy, the Fernandez reaction with an antigen made from the total proteins of

leproma was found positive in 3·6% (though the percentage increased with age); in lepromatous leprosy it was 0·5%; in tuberculoid cases it was 77·2%; in healthy non-contacts sensitized with 1 or 2 injections of ordinary whole bacillary lepromin it was 75·2%; in healthy non-contacts sensitized 6 weeks previously with BCG it was 81·2% when the vaccination had been intradermal, and 46·8% when it had been oral; in tuberculous patients with the Mantoux reaction negative at 1 in 1,000 the positivity was 43%. These results indicate that antigen from the whole proteins of leproma is sufficiently sensitive to show the different degrees of specific sensibility or of joint sensibility. One of the disadvantages of whole bacillary antigen is that it sensitizes to itself, and this the total protein antigen does not do.

The Mitsuda test with Floch's lepromins is discussed by G. Basombrío, E. D. L. Jonquières and H. J. S. Caballero (p. 151). Three antigens for testing the lepromin reaction were used: (1) Mitsuda's pure lepromin diluted 1 in 20; (2) the same diluted 1 in 750 and with powdered normal skin added; (3) the same diluted 1 in 750 and with glycerin and liquid paraffin added. A coincidence of response was obtained, in 80% of the 49 patients tested, with the first and third antigens and in 72% with the first and second antigens. But in contacts without signs of leprosy only 28·5% were positive with the highly diluted antigen, compared to 82·8% with the Mitsuda–Hayashi ordinary antigen. The diluted antigens are therefore considered unsuitable for testing the resistance of leprosy contacts.

The mechanism of antileprotic activity of the sulphones is dealt with by M. Bergel (p. 156). The antileprotic effect of sulphones is due to the direct primary antioxidant effect of its component group of amines. These components are not bactericidal, bacteriolytic or bacteriostatic, but they are antioxidant and have an antagonistic action to polymerization, co-polymerization and fat formation. The antioxidant effect of DDS is due to its power to delay the oxidation of substances *in vitro*, as in the conservation of resins, and to cause *in vivo* disappearance of fat from subcutaneous tissue and other parts of the body, which remains present in controls. It is suggested that: (a) DDS protects vitamin E in the digestive tract from oxidation; (b) DDS is absorbed and deposited in the fatty tissues where it acts as a biological antioxidant reinforcing the action of the tocopherols. It is recognized that many aminophenols which have antioxidant power *in vitro* lack antioxidant activity *in vivo*. Other antioxidants of similar structure are mentioned, such as diaminodiphenyl methane, which differs from DDS only in the methyl group.

A. J. Melamed discusses the pathogenesis of the lepromatous lepra reaction (p. 167). The contention of this paper is that the lepra reaction in lepromatous leprosy is a sign of sensitivity of the lepromatous tissue and belongs to the group of fixed vascular delayed reactions, a group which also includes periarteritis nodosa. Lepromatous tissue prior to reaction is in a state of critical equilibrium as regards cortisone, similar

steroids or equivalent conditions. Thus any stress circumstance which increases the consumption of cortisone may provoke or aggravate lepra reaction.

F. F. Mercadante and E. T. Capurro submit a paper on evaluation of reports of leprosy patients received in the last 5½ years by the Director of the Antileprosy Campaign (p. 174). The figures are given in tabular form. Table I gives the percentage of types of leprosy as they occur in the 5½ years up to 1955 in the various provinces: lepromatous 46·7, tuberculoid 32·5, uncharacteristic 10·7, without clinical form 9·9. Tables II and III give the percentage of men and women divided according to nationality (Argentinian or foreigners) and clinical form. Tables IV and V divide cases geographically and according to type. In the littoral zone 49·2% are lepromatous and 28·8 tuberculoid, while in the two southern provinces 50% are lepromatous and 31·2 tuberculoid.

The ambulant doctor as an element in the antileprosy campaign is discussed by V. Bosq (p. 179). It is mentioned that there are 11,359 open cases of leprosy in Argentina interned in sanatorium colonies. There are also numerous dispensaries, most of them supported by private initiative. The work of the ambulant doctor is chiefly in the scattered regions where there is no dispensary. Besides diagnosing and treating patients, he has to examine contacts. *Ernest Muir*

Ekambaram, V. **Six Years Aqueous Sulphetrone Therapy in a Rural Area.** *Leprosy Review.* 1958, Apr., v. 29, No. 2, 102–10, 1 map.

Treatment comprised intramuscular injections of 3 ml. of a 50% solution of aqueous sulphetrone twice a week. As the solution is acid and gives a burning sensation it must be neutralized with sodium carbonate. Of 15 patients treated (all lepromatous) 6 became completely negative bacteriologically and clinically, 3 improved greatly, 1 relapsed owing to irregularity of treatment, and the others are making good progress. The advantages are the low toxicity of the drug, the fairly rapid action and absence of complications. The disadvantages, compared with DDS, are the need for injections twice weekly, the time required to produce negative bacteriological results, and the expense.

The work was done in Madras State. *Ernest Muir*

See also p. 731, Tarabini, **The Anti-Protozoal Action of the Sulphones and the Anti-Malarial Action in particular.**

Gokhale, B. B. **Treatment of Trophic Ulcer of Sole in Leprosy with certain Hydrogenated Ergot Alkaloids, (Hydergine-Sandoz).** *Leprosy in India.* 1957, Apr., v. 29, No. 2, 44–7.

Hydergine, a mixture of equal parts of the ergot alkaloids dihydroergocrystine, dihydroergocornine, and dihydroergokryptine, was injected

intra-arterially in the femoral artery in 19 patients suffering from trophic ulcers of leprosy. The usual dose was 0·3 mgm. of Hydergine on alternate days or every third day. Certain interesting features in some of the cases are noted. The equimixture tends to promote peripheral vasodilation. Primary healing of all the ulcers took place, but they recurred in 4 patients. In another an ulcer occurred in a different place. 5 patients could not be traced, but in the remaining 9 the ulcers had so far remained healed. *Ernest Muir*

Ranade, S. S., Gokhale, B. B. & Momin, Q. **Epineurectomy in the Treatment of Trophic Ulcers in Leprosy.** *Leprosy in India.* 1957, Apr., v. 29, No. 2, 48–51.

The authors performed epineurectomy on 31 leprosy patients, and describe the results on trophic ulcers of the feet. The operation was done under local novocaine anaesthesia, an incision being made behind the head of the fibula, and the lateral popliteal nerve was freed from the epineural sheath. In 19 of the 31 patients there was complete healing within an average of 21 days, 3 could not be traced, and in the remaining 9 the ulcers healed to a point, but not completely. In one case the ulcer healed and at the same time drop-foot was relieved. Radiologically it was shown that there was recalcification of decalcified bone after the operation. *Ernest Muir*

HELMINTHIASIS

*In this section abstracts are arranged as far as possible in the following order:—*Trematodes *(schistosomes, other flukes);* Cestodes *(Diphyllobothrium, Taenia, Echinococcus, other cestodes);* Nematodes *(Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.).*

Watkins, T. I. **The Chemotherapy of Helminthiasis.** *J. Pharmacy & Pharmacol.* London. 1958, Apr., v. 10, No. 4, 209–27. [182 refs.]

In this review the author, from the Research Department of Boots Pure Drug Co., deals mainly with intestinal helminthic infections. He notes the slow progress made in the chemotherapy of helminthiasis compared with that in the bacterial and protozoal fields, but stresses the point that control of helminthiasis will not be accomplished by chemotherapy alone.

He then discusses the importance of helminthiasis in man and animals and gives some details of screening tests and the difficulties accompanying their use and assessment.

The compounds used as anthelmintics are then reviewed under the headings of natural products (such as santonin, extract of male fern, oil of chenopodium and the active principle of areca nut), and synthetic compounds (phenols, halogenated hydrocarbons, phenothiazine, the piperazines, metallic compounds, diphenylmethanes, cyanine dyes, acridines, antibiotics and proteolytic enzymes). The literature on all these substances is reviewed and there are 182 references.

H. J. O'D. Burke-Gaffney

World Health Organization. Technical Report Ser. No. 139. **African Conference on Bilharziasis, Brazzaville, French Equatorial Africa, 26 November–8 December 1956. Report.** 42 pp., 5 maps on folding pl. [Refs. in footnotes.] 1957. Geneva: Palais des Nations. [Sales agent for U.K., H.M. Stationery Office.] [1s. 9d.; $0.30; Sw.fr. 1.–.]

The distribution of schistosomiasis in Africa south of the Sahara, given both verbally and as a carefully itemized map, a statement of the distribution and significance of 18 species of *Biomphalaria* and 27 species of *Bulinus*, a tabulated analysis of their known susceptibility to 14 strains or species of schistosomes and a list of recognized animal schistosomes of Africa, make an excellent factual background to opinions later expressed. Many of these are concerned directly or indirectly with the controversial question of the importance of schistosomiasis to the affected population. The significance of species of parasite and numbers of infecting worms is recognized, as is the existence of immunity following early or first infection. A heavy and repeated infection may occur before immunity is established, or a sufficiently heavy cercarial invasion will break down any resistance barrier and lead to infections of any degree of severity up to the fatal. There is no discoverable valid evidence of association with cancer of the bladder or of the liver, but infection in adults may interfere with mental concentration, social behaviour and ability.

The report reviews and lists the type of information which is required to refine present knowledge of the morbidity and the mortality of the disease and of its epidemiology. Though serological tests and particularly the complement-fixation test may be of value, most reliance in diagnosis is placed upon the finding of eggs for which the techniques are described. The best is sedimentation, direct in the case of urine or in 0·5% glycerinated water for faecal samples, for which the MIFC (Merthiolate, iodine, formaldehyde concentration) technique has also proved useful in the field.

Animal reservoirs, important in the East, are of minor importance in Africa though rodents may have some influence. Most infections are derived from human beings and are more commonly due to *Schistosoma haematobium*, except when the population is concentrated where *S. mansoni* may predominate. There is little doubt that the extension of irrigation operations may be causing the spread of the disease.

A review of control methods includes a comparison of the qualities of some molluscicides, preference being given to sodium pentachlorophenate. Mass treatment can be expected to reduce the infection potential and some experience with antimony and with lucanthone hydrochloride is reviewed. There is a careful analysis of techniques of assessment of cure; the absence of viable eggs three weeks after conclusion of treatment indicates a useful immediate effect but demonstration of cure depends on their absence at least 12 weeks after conclusion of treatment and, ideally, 8 to 10 months later.

The report concludes with comments on environmental sanitation, water management, health education methods, collaboration between authorities and the recommended activities of WHO in the control of schistosomiasis.

G. Macdonald

de Morais, T. As bilharzioses humanas no Distrito do Niassa (África Oriental Portuguesa). [**Human Schistosomiasis in the Niassa District, Portuguese East Africa**] *Anais Inst. Med. Trop.* Lisbon. 1957, Mar.–June, v. 14, Nos. 1/2, 145–53, 1 graph & 1 map.

The English summary appended to the paper is as follows:—

"Studying 380 children of school age between 3 and 16 years of age in the Niassa district it was found that vesical Bilharziasis was prevalent in all the district with an infection rate of 70·53% while intestinal Bilharziasis was patchily distributed presenting an average infection rate of 5·78%. No relation seems to be found between sex or age and the incidence rate."

Freedman, L. & Elsdon-Dew, R. **A Note on the Incidence of Bilharzia in Durban Bantu School Children.** *South African Med. J.* 1958, Mar. 22, v. 32, No. 12, 311.

The authors examined a single specimen of urine from 517 boys and 356 girls in a Bantu co-educational school in Durban. *Schistosoma haematobium* ova were found in 46·8% of boys and 20·2% of girls. Figures are tabulated for the age-groups 0–9, 10–14 and 15+, from which it is evident that younger girls have an incidence similar to that of boys in their age-group, but do not show an obvious increase in incidence with age; boys on the other hand showed in this series an incidence of 22·2%, 56·4% and 51·2% at each of the age-groups.

The uncleanly habits of these children were indicated by the finding of a number of intestinal helminths in the specimens.

The authors point out that the true incidence of *S. haematobium* cannot be revealed by the examination of a single random specimen, but the figures show the prevalence in the Bantu population even under urban conditions.

H. J. O'D. Burke-Gaffney

Saif, M. **Sudden Shock due to Treatment with Stibophen. A Case Report.** *J. Egyptian Med. Ass.* 1957, v. 40, No. 12, 849–55.

"1. A case of collapse after the fifth injection of Stibophen, B.P., is recorded.

"2. Clinical data revealed a picture of severe shock, while laboratory findings elucidated a picture of mild intravascular haemolysis.

"3. No sulphaemoglobin could be detected by means of the spectrophotometer in urine or blood of the patient, but the spectroscope was not used for confirmation.

"4. Oxygen inhalation proved to be life-saving when applied early with intravenous percorten as an essential adjuvant. Intravenous hypertonic glucose is not recommended, nor are sedatives. In general, drastic medication is to be avoided.

"5. The mechanism of the process appears to be very delicate, thus needing delicate manipulation and tactful consideration."

[See this *Bulletin*, 1956, v. 53, 609.]

de Carneri, I. Conservation au laboratoire d'une souche de *Schistosoma mansoni*. [**Maintenance of a Strain of *Schistosoma mansoni* in the Laboratory**] *Bull. Soc. Path. Exot.* 1957, Sept.–Oct., v. 50, No. 5, 787–94. [29 refs.]

The laboratory methods employed at the Institute of Hygiene and Microbiology of the University of Pavia and the Carlo Erba Institute for Therapeutic Research, Microbiology Laboratory, Milan, in the maintenance of *Schistosoma mansoni* in the white mouse and *Australorbis glabratus* are given in detail. *W. E. Kershaw*

Pepler, W. J. **Histochemical Demonstration of an Acetylcholinesterase in the Ova of *Schistosoma mansoni*.** *J. Histochem. & Cytochem.* Baltimore. 1958, Mar., v. 6, No. 2, 139–41, 2 figs.

"1. An acetylcholinesterase has been demonstrated in the central nervous system of the miracidium of *Schistosoma mansoni* by using acetylthiocholine and O-acetyl-5-bromoindoxyl as substrates in association with inhibitors.

"2. No histochemical evidence of any non-specific esterases, lipases or of pseudocholinesterases could be found."

Paraense, W. L. **Apertural Lamellae in *Australorbis glabratus*.** Reprinted from *Proc. Malacol. Soc. of London.* 1957, Mar., v. 32, Pt. 4, 175–9, 3 figs. & 1 pl.

Paraense, W. L. & Deslandes, N. *Biomphalaria boissyi*, synonyme probable de *Taphius nigricans*. [*Biomphalaria boissyi*, **Probable Synonym of** *Taphius nigricans*] *Ann. Parasit. Humaine et Comparée.* 1957, Oct.–Dec., v. 32, Nos. 5/6, 482–90, 13 figs.

These authors, after a comparative study of the anatomy of *Biomphalaria boissyi* and *Taphius* (=*Australorbis*) *nigricans*, have reached the conclusion that the two species are probably identical.

[There exists already a considerable amount of literature on the relationships between the South American and African genera of planorbid snails which act as intermediate hosts for *Schistosoma mansoni*. Hubendick (*Trans. Zool. Soc.*, London, 1955, v. 28, 453) has discussed the question and pointed out the desirability of retaining *Biomphalaria* as the generic name despite the fact that it is a junior synonym for *Taphius*. More recently Barbosa has summarized most of the information relevant to the problem. Both authors stressed the need for caution until the situation has been considered by the International Commission for Zoological Nomenclature and a decision given. It is, therefore, unfortunate that Paraense and Deslandes, although possibly correct in their interpretation of their results, should have published this paper at the present time.] *C. A. Wright*

Díaz-Rivera, R. S., Ramos-Morales, F., Sotomayor, Z. R., Lichtenberg, F., Garcia-Palmieri, M. R., Cintrón-Rivera, A. A. & Marchand, E. J. **The Pathogenesis of Manson's Schistosomiasis.** *Ann. Intern. Med.* 1957, Dec., v. 47, No. 6, 1082–107, 6 figs. & 1 chart. [20 refs.]

Details are given of 13 cases of Mansonian schistosomiasis, selected from some 400 studied in Puerto Rico during the last dozen years. These illustrate features of the natural history of the disease and the difficulties that may lie in the correct interpretation of its symptomatology.

The examples range from one extreme, in which very severe clinical manifestations caused early invalidism and the death of a young adult, to the other, in which disclosure of the infection was purely incidental during investigation of troubles of other causation. In Puerto Rico the majority of the inhabitants of the undeveloped areas of necessity are exposed to infection. Poverty and ignorance play an important part in the progress of the disease; nevertheless only those with massive parasitic infections die as a result of it in combination with other serious disorders. Education, improved sanitary services, and betterment in the standard of living, minimize the effects of Mansonian schistosomiasis. This condition is primarily an intestinal disorder; though the lungs and liver rarely escape involvement extensive lesions of these organs are not common in Puerto Rico. The authors append the following summary:—

"An analysis of the data obtained from a prolonged, detailed study of

the life history of 400 cases of acute and chronic Manson's schistosomiasis indicates that the earliest phase is mainly dominated by a hypersensitivity state of abrupt onset. The acute disease is of variable duration and severity, generally mild, and at times subclinical. In most instances it is mistaken for a mild enteritis, attributed mainly to dietary indiscretions, and at times it is mistaken for a salmonellosis. The explosive disease is observed only among those who are heavily infected and poorly nourished, and who have defective body defenses.

"After a variable asymptomatic incubation period (21 to 42 days), allergic manifestations appear with oviposition. The continuous production of allergens by the ova and/or adult parasite may serve to perpetuate the hypersensitivity reaction. The local reaction produced by the eggs and/or adult parasites leads to variable degrees of vascular changes in the liver, intestine and lungs. Actual destruction of tissue and foreign body reaction of allergic origin may also occur.

"Although most of the cases of Manson's schistosomiasis are mild and remain undiagnosed, extensive pathologic alterations may occur with heavy infestations when accompanied by a poor dietary. In some instances the picture may be dominated by portal hypertension with fragile esophageal varices and congestive splenomegaly with signs of hypersplenism. Cirrhosis of the liver is mainly governed by poor nutrition, but is undoubtedly influenced by the parasitosis. In some cases the prominent feature is chronic cor pulmonale, with pulmonary hypertension from arteriolitis (egg embolization and superimposed pneumonitis).

"The severity of the clinical picture is chiefly influenced by socio-economic factors, and by the adequacy of the defensive mechanism of the host, rather than by the parasitosis per se. Thus, death with but not from Manson's schistosomiasis is the general rule. Since there are no adequate anti-schistosomal agents, it seems that curability depends mainly on the development of immunity." *A. R. D. Adams*

Marchand, E. J., Marcial-Rojas, R. A., Rodríguez, R., Polanco, G. & Díaz-Rivera, R. S. **The Pulmonary Obstruction Syndrome in *Schistosoma mansoni* Pulmonary Endarteritis. Report of Five Cases.** *Arch. Intern. Med.* 1957, Dec., v. 100, No. 6, 965–80, 14 figs. [13 refs.]

Manson's schistosomiasis is known to occur in 11% of the population of Puerto Rico; there are now about a million immigrant Puerto Ricans in the U.S.A.

5 of these, with schistosomal cor pulmonale, are the subject of this paper; their ages lay between 19 and 45 years. Detailed histories and the clinical, laboratory, X-ray, and electrocardiographic findings are given of each case, and the autopsy findings are available in 4 of the 5. An outstanding feature common to all was the insignificance of the pulmonary findings in spite of very severe respiratory distress, usually of

short duration but rapidly progressive. It may be that infection of the respiratory tract precipitates cardiac decompensation in these cases. The essential histological changes in the lungs are those of an obliterative pulmonary arteriolitis due to repeated embolism of the eggs. When cardiac decompensation occurs death shortly follows. In an addendum the authors state that 5 further similar cases have come under their care, and that the findings in these are similar. *A. R. D. Adams*

See also p. 766, Shafei, **The Relationship of Cancer of the Rectum to Intestinal Amoebiasis and Bilharziasis.**

von Schilling, B. & Henríquez L., M. Infección natural de *Leppus cuniculus* por *Schistosoma mansoni*. [**Natural Infection of** *Leppus cuniculus* **by** *Schistosoma mansoni*] *Rev. Latinoamericana de Anatom. Patol.* Caracas. 1957, July–Dec., v. 1, No. 2, 103–8, 4 figs. on 2 pls. [16 refs.]

The English summary appended to the paper is as follows:—

"It has been claimed that *Schistosoma mansoni* is pathogenic to the rabbit. However, it has been difficult to demonstrate the presence of lesions of ova from the intestinal wall or in the stools.

"In 4 rabbits granulomas with eggs of *Schistosoma mansoni* were found in the liver and intestines and ova in the contents of the colon.

"The possibility of the rabbit as a reservoir of bilharziosis is discussed."

Kuntz, R. E. *Schistosoma* **sp. in Shrews in Lower Egypt.** *Proc. Helminthological Soc. of Washington.* 1958, Jan., v. 25, No. 1, 37–40. [14 refs.]

"Numerous mammals common to the irrigated areas of Lower Egypt were examined to determine whether any were naturally infected with schistosomes. Seven of 16 shrews, *Crocidura olivieri*, from one area were infected with a total of approximately 40 schistosomes. These parasites, although similar to *S. mansoni*, are sufficiently different to warrant a brief description. Their true identity remains unknown and they are not described as a new species since pertinent data such as shape of the mature egg, etc., are lacking."

Ching, Wei-Hsin. **Acute Schistosomiasis. Clinical Manifestations of 96 Cases.** *Chinese Med. J.* Peking. 1958. Jan., v. 76, No. 1, 1–10, 6 figs.

Some hundreds of cases of acute schistosomiasis (*Schistosoma japonicum*) occurred in Kaoyu, Kiangsu, during the summer of 1955. 96 of these patients, preponderantly farmers, were observed in hospital. The shortest incubation period was 23 and the longest 65 days; in most cases

it lay between 30 and 60 days. In 69 patients there was a history of cercarial dermatitis, often severe. Fever and sweating, headache and anorexia, abdominal pain, diarrhoea, and cough, and in some cases urticaria and angioneurotic oedema, marked the onset. Most of the patients entered hospital between 30 and 40 days after the onset of illness, and by then the fever usually was subsiding or had ended; the fever as a rule was intermittent, and sometimes it showed a double daily rise. Enlargement of the liver, especially of the left lobe, was a striking feature of these cases, and in over half of them the spleen also was enlarged. In some there were physical signs in the lungs. The blood picture in all initially showed an eosinophilia ranging from 7 to 74%; this markedly diminished as the patients' condition deteriorated. In all cases a single stool examination, by means of the hatching test, yielded the specific diagnosis.

Treatment with tartar emetic [presumably the potassium salt] given as 1% solution in saline to a total of 25 mgm./kgm. over 25 consecutive days for those in good condition, and in reduced daily dosage for longer periods in those not, proved safe and effective. It ensured a marked improvement in the patients' condition, though it did not eradicate the infection in many; the latter, however, so improved in health that further specific treatment could safely be given. Supportive and symptomatic treatment in the form of bed rest, vitamins B and C and glucose infusions, with blood transfusions and antipyretic measures where necessary, proved very valuable adjuncts to the specific treatment. *A. R. D. Adams*

Dao, Chin, T'ang, Yen, Ch'i, Wei-Liang, Shen, Tsung-Jen & Ts'ai, Yi-Hsin. **Acute Schistosomiasis: Clinicopathologic Report of Three Cases.** *Chinese Med. J.* Peking. 1958, Jan., v. 76, No. 1, 40–46, 3 figs. on pl. [10 refs.]

3 patients dying of fulminating *Schistosoma japonicum* schistosomiasis in Shanghai afforded an opportunity for post-mortem studies of the pathology of the condition. The first, a girl of 16 years, was admitted 2 months after infection, over 3 successive days, with lethargy and fever, upper abdominal pain and diarrhoea, and an enlarged liver and spleen. On X-ray examination the lung markings were found to be increased, with miliary infiltrations over both lower lung fields. Treatment with tartar emetic was begun but had to be suspended when the temperature began to swing widely, and severe anaemia with ascites and oedema of the ankles developed. She died in coma, after a suddenly developing general convulsion, a week later. Numerous nodules were found on the lungs, in the liver, and on the mucosae of the small and large bowels; the mesenteric glands were swollen. Numerous ova were seen in the lesions; no characteristic lesions were found in the brain.

The second was a 19-year-old boy also exposed to heavy infection 2 months earlier. On admission he had high fever, cough and pain in the

right upper abdomen—but no diarrhoea. The liver was enlarged. His condition deteriorated, with the appearance of some icterus after 2 injections of tartar emetic, and continued to do so under further specific treatment, with increasing ascites, wasting and severe abdominal pain. He died 35 days after the antimony treatment was stopped. Again, there were nodules in the lungs, in the small bowel—particularly the upper jejunum—and the large intestine. The liver was cirrhotic and studded with nodules; the spleen and kidneys also showed nodule formation. The mesenteric glands were much enlarged and contained a yellow purulent material. There were varices in the lower oesophagus, and there were small whitish elevations on the posterior wall of the stomach and the muscular ring of the pylorus. Some dozens of adult worms were found in the radicle of the portal vein and its main branches. There were great numbers of ova in the mucosa, and lesser numbers in the deeper layers, of the stomach wall and pylorus, jejunum, ileum and colon. Many ova were found in abscesses in the mesenteric glands. The lungs, kidneys, liver, spleen and adrenals also contained ova within abscesses

The third, a boy of 17 years, had been infected 3 months before admission with fever, abdominal pain and diarrhoea, and a cough. The liver was much enlarged and there was an apical systolic murmur. His condition was complicated by an attack of typhoid (blood culture positive). When the latter had successfully been treated with chloramphenicol, tartar emetic treatment for the schistosomiasis was begun. During this pulsus alternans and hypotension developed and the drug was stopped. Adams-Stokes syndrome with paroxysmal ventricular flutter and fibrillation appeared, and he died within another 3 days despite appropriate treatment. Numerous tubercles in this case also were found in the liver, lungs, jejunum, colon and rectum. Many ova were recovered from these. There also was a pyogenic abscess in one lung.

A character of all these cases was the absence of eosinophils from the peripheral blood—this usually indicates a grave prognosis. Overwhelming systemic intoxication with ultimate acute liver failure is the usual cause of death in fulminating schistosomiasis, which invariably runs a rapid and fatal course if not promptly and effectively treated. In such cases, however, the toxic effect of antimonials on the heart and liver tends to be exaggerated; thus, until a suitable non-toxic drug is found the death rate in this condition will in any event remain high. *A. R. D. Adams*

Chiang, Shih-T'ao & Chang, Kuo-Ch'en. **Schistosomiasis japonica: Radiological Pulmonary Manifestations in 47 Cases.** *Chinese Med. J.* Peking. 1958, Jan., v. 76, No. 1, 24–39, 12 figs. on 3 pls. [30 refs.]

Between 1950 and 1956 66 patients with *Schistosoma japonicum* infections were found to have radiologically visible lung changes attributable to the infection; 47 of these cases, all early, were seen by the authors.

In these 47 patients changes were to be seen in the lung fields, hilar shadows, the lung markings and the diaphragm; none were observed in the mediastinal or heart shadows. The lung field lesions could be typed as follows:— (a) mottling (22 cases), (b) small patches of infiltration (16), (c) large patches and veil-like shadows (3), (d) miliary infiltration (5), and (e) solitary nodular infiltration (1 case). X-ray photographs illustrate these, and their tendency to persist in spite of specific treatment for the parasitic infection. Other changes noticed in most cases were an increase and distortion of the lung markings with enlargement of the hilar shadows. Diaphragmatic changes seen were flattening of its dome and obliteration of the costophrenic sinus, and tenting. The diaphragmatic changes, in view of the findings in animal experiments, are thought to be due to tissue damage consequent on passage of the cercariae through the tissues, while the lung lesions are supposed to be due to damage caused by cercariae or by the lodgment of ova.

In contrast to the statements of some other workers, specific treatment was found to have little or no effect in resolving the lung shadows in the authors' cases. The differentiation of the lung lesions due to schistosomiasis from those of other causation is not easy. In this condition the shadows tend to be concentrated in the hilum and base of the lung, and are rarely seen in the outer zone and apex; their density is light and outline vague. None of the radiological changes seen in the chest are pathognomonic, but they become significant when the parasitic diagnosis is established. *A. R. D. Adams*

Liu, J., Hsü, Chao-Yueh, Hsü, Pao-Yuan & Tai, Tze-Ying. **Pulmonary Manifestations of Acute Schistosomiasis japonica.** *Chinese Med. J.* Peking. 1958, Feb., v. 76, No. 2, 144–51, 4 figs. on pl.

Pulmonary complications of schistosomiasis have often been recorded, especially in Egypt where 33% of those with this disease have lung lesions due to it, and 2% die of heart and lung disease in the form of Ayerza's syndrome [this *Bulletin*, 1938, v. 35, 665; 1949, v. 46, 57]. Nevertheless, there are very scanty records of pulmonary lesions attributable to an *S. japonicum* infection. During an epidemic of schistosomiasis due to this parasite in 1955 the high incidence of pulmonary lesions impressed the authors. They here report the first 47 such cases they saw, and conclude with the following summary:—

"Forty-seven cases of pulmonary schistosomiasis seen in Shanghai during the summer and autumn of 1955 were reviewed. Pulmonary lesions were almost always present during the acute stage of schistosomiasis and can be considered as a part of the usual clinical manifestations. Animal experiments and autopsy examinations proved beyond doubt that the lesions were caused by the deposition of schistosome ova and were not at all related with the cercariae.

"Clinically, the respiratory symptoms and signs were usually mild in

spite of the extensive pulmonary involvement. Sputum was repeatedly negative for schistosome ova. Diagnosis of pulmonary lesion depends mainly upon roentgenologic examination. Ayerza's syndrome due to *S. haematobium* and *S. mansoni* has not yet been reported in schistosomiasis japonica and deserves further attention. Roentgenologically, the most characteristic finding in pulmonary schistosomiasis was the presence of miliary infiltrations along the perivascular distribution in both lung fields, frequently associated with exaggeration of lung markings and pleural changes. However, the X-ray picture was pleomorphic in character and varied during different stages of development. Although marked absorption usually took place within one to two months, yet some residual signs such as faint granular dots and thickening of the interlobar fissure frequently remained." *A. R. D. Adams*

Liu, J., Hsü, Chao-Yueh, Liu, Yü-K'un & Cheng, Wei-Ju. **Therapeutic Effect of Antimony Potassium Tartrate in the Treatment of Schistosomiasis.** *Chinese Med. J.* Peking. 1958, Jan., v. 76, No. 1, 11–23. [10 refs.]

Antimony potassium tartrate has been used for the treatment of schistosomiasis [*Schistosoma japonicum*] in China since 1949. Between 1952 and 1955 1,656 patients with this disease were treated with this drug in hospital by the authors; 471 of these, subsequently not at risk of reinfection, have repeatedly been re-examined. The gross dosage of tartar emetic used ranged from 20 to 25 mgm./kgm. of body weight, and was divided into 20 injections given intravenously each day in 1% saline. When undue reactions resulted the course was protracted by intervals of a few days without treatment. Symptoms, such as abdominal pain and dysenteric diarrhoea, slight ascites, and focal epilepsy, were rapidly relieved by the treatment. The body weight and physical condition increased materially in more than half the patients treated, irrespective of whether the infection was sterilized or not. The sizes of the liver and of the spleen diminished in some patients, but in the majority they were unaffected by the treatment.

Re-examination of the stools, by the hatching test, of 378 patients immediately on the completion of the course of treatment showed 11 (3%) still to be passing viable eggs, but 4 of these subsequently became negative. On increasing the dosage of the drug from a gross 20 mgm./kgm. body weight to 25 mgm./kgm. the cure rate (based on repeated stool examinations) rose from 41·4% to 74·2%.

The factors associated with parasitic relapse are the intensity of the infection, the dosage of the drug given, and the age of the patient. Juveniles are more difficult to sterilize of their infections than are adults, and previous unsuccessful treatment is also associated with a high relapse rate. While on the one hand, as indicated above, the finding of viable eggs in the stools immediately on the completion of treatment does not

necessarily indicate failure to cure the infection, on the other it is necessary that stool hatching tests should remain negative for at least a year before parasitic cure can be claimed. In view of the very appreciable relapse rate in cases of heavy infection and in children, tartar emetic treatment as now given is far from satisfactory. The total dosage and the duration of treatment should both be increased. Early effective treatment is highly desirable to forestall liver damage, with cirrhosis, ascites, jaundice and oesophageal varix formation and their irreversible results.

A. R. D. Adams

Huang, Ming-Hsin, Chiang, Shao-Chi, P'an, Ju-Sun, Yü, Kuo-Juei, Lu, Cheng-Wei, Hsü, Chia-Yü & Kao, Wei-Shih. **Mechanism and Treatment of Cardiac Arrhythmias in Tartar Emetic Intoxication: with special reference to Atropine Therapy.** *Chinese Med. J.* Peking. 1958, Feb., v. 76, No. 2, 103–15, 3 figs. on 2 pls. [25 refs.]

Antimony compounds affect the heart and they commonly cause sinus arrhythmia with diminution of the intensity of the heart sounds. On electrocardiography the T-wave is found to be flattened or inverted, and the QT interval prolonged. Ventricular extra systoles, and auricular fibrillation or heart block occur in a few cases. In severe intoxications sudden and paroxysmal Adams-Stokes syndrome with ventricular tachycardia or ventricular fibrillation occur, and death may follow repeated episodes of this. 51 such patients were seen between 1952 and 1954; 40 of them (80%) died as a result of the heart lesions.

The present series of patients was seen in Shanghai in 1956; all had chronic schistosomiasis [*Schistosoma japonicum*] but most were symptomless and able to work. All were treated with tartar emetic [the potassium salt].

The authors conclude with the following summary:—

"1. Eleven cases of Adams–Stokes syndrome with severe ventricular arrhythmias occurring in the course of tartar emetic treatment for schistosomiasis are reported. Seven patients receiving large doses of atropine intravenously as an emergency measure recovered.

"2. The mechanism of antimony-induced ventricular arrhythmias and Adams–Stokes syndrome is explained. It is probably through the combined effects of functional disturbances of vegetative nervous system and hyper-excitability of myocardium induced by antimony. Antimonial compounds, exerting inhibitory effect upon the cerebral cortex, produce functional disturbance of the subcortical vegetative nervous system and vagotonia. A focus of excitation is formed in the vagal center by constant impulses from the damaged myocardium. Some stimuli, passing through this focus, may produce abnormally strong impulses reaching the heart via the vagus to bring the A-V node into a state of parabiosis. Induced ectopic pace-makers in the neighboring supernormally excitable heart

muscles are responsible for the ventricular arrhythmias which may precipitate an attack of Adams–Stokes syndrome.

"3. The use of large doses of atropine for emergency treatment is proposed. Atropine renders cells refractory to acetylcholine, an action equivalent to the reduction of vagal tone. It abolishes the parabiotic state of the A-V node and restores the normal sinus rhythm. Barbiturates which produce central sedation and decrease the vagal tone and myocardial excitability may be given at the same time. Procaine is clinically useless and sometimes may even aggravate arrhythmias. Digitalis, adrenaline, caffeine and coramine are definitely contra-indicated." *A. R. D. Adams*

Chu, Chiao-Chen, Liang, Yu-i & Ting, Kuang-Sheng. [**Studies on Anti-bilharzial Drugs. XI. Experimental Therapy with 32 Drugs**] Reprinted from *Acta Physiologica Sinica*. 1957, Dec., v. 21, No. 4, 394–402. [23 refs.] [In Chinese.]

The English summary appended to the paper is as follows:—

"Thirty-two organometallic or organic compounds were tested on the therapeutic effect against schistosomiasis japonica in white mice, rabbits and dogs. In this paper we reported the results of 4 antimony cyclic-mercaptides and 2 corresponding tin compounds and 1 organomercury compound, 3 stibonic acids and related compounds, 4 bis(*p*-amino-phenoxy)-thiaalkanes, 4 EDTA-chelates of antimony, tin, mercury and bismuth, 'TWSb', hexachloroethane, tetrachloroethylene and some other antimony, tin and mercury compounds.

"The organoantimony compounds were found to be more active than the others, and the most promising one was Sb-11 which is now being submitted to a further study."

Brante, G. & Ernberg, T. **The Mechanism of Pernicious Tapeworm Anemia studied with ^{60}Co-Labelled Vitamin B_{12}.** *Acta Med. Scandinavica*. 1958, Mar. 7, v. 160, No. 2, 91–8, 2 figs. [11 refs.]

Two cases of infection with *Diphyllobothrium latum*, with symptomatic pernicious anaemia and low B12 serum concentration, were studied after the administration of B12 containing radioactive cobalt. The radio-activity of the expelled tapeworm was also measured. After oral administration radioactivity over the liver (the normal response) was minimal, but there was marked and persistent radioactivity over the lower left abdominal quadrant. (This area was painful and was probably over the situation of the tapeworm.) The result of the Schilling test was the same for both cases. With B12 *per os*, the urine excretion was considerably below normal, with or without Carbacholine. Addition of pig-pylorus mucosa or normal gastric juice to the dose of B12 led to much greater excretion. Gastric juice from one patient had a similar effect on excretion in a patient with pernicious anaemia.

The worms, expelled 38 and 22 days respectively after the tests, contained 12% and 7% of the total radioactivity. This unexpectedly low activity was possibly due to secondary loss, *e.g.*, from autolysis, from the worm over the period between the tests and expulsion.

The authors suggest that the competition of the host and worm for vitamin B12 may derive from the activity of the intrinsic factor and the " absorbing organ " of the worm. *B. G. Maegraith*

Rausch, R. & Williamson, F. S. L. **Studies on the Helminth Fauna of Alaska. XXXIII. The Description and Occurrence of** *Diphyllobothrium alascense* **n.sp. (Cestoda).** *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1958, v. 9, No. 1, 64–72, 5 figs.

" A new species of cestode, *Diphyllobothrium alascense* n. sp., is described. The material was collected at the autopsy of 10 sledge dogs in the Eskimo village of Chevak. From other species of *Diphyllobothrium* occurring in piscivorous birds and terrestrial mammals, the new species is readily differentiated by the form of its scolex. Its morphological characteristics have been compared with those of other species of *Diphyllobothrium*.

" The last intermediate host of *D. alascense* n. sp. has not been determined. Since the dogs from which the material was collected had been fed two species of fishes, *Pungitius pungitius Linnaeus* and *Dallia pectoralis* Bean, and since the dogs contained many cestodes in early stages of development, it appears that the plerocercoid may occur in these fishes.

" Fecal examinations have disclosed *Diphyllobothrium* eggs in 30 per cent of the Eskimo in this region. The above-mentioned fishes are commonly eaten by the Eskimo during the late winter. Since they are usually eaten uncooked or frozen, it is unlikely that any plerocercoids that they contain are often killed. *D. alascense* n. sp. is probably also a parasite of man."

[See also this *Bulletin*, 1957, v. 54, 845, 1333.]

Lassance, M., Peeters, E. & Grailet, L. Note sur un taenifuge de masse nouveau, l'Anthiphen. [**Note on a New Massive Taenifuge, Anthiphen**] *Ann. Soc. Belge de Méd. Trop.* 1957, Oct. 31, v. 37, No. 5, 627–30.

The authors tried 5-5′-dichloro-2-2′ dihydrodiphenylmethane, a derivative of dichlorophen marketed as Anthiphen (May and Baker) for the removal of *Taenia saginata* from patients at Ituri, Belgian Congo, with a view to using it in massive campaigns against taeniasis in Ituri. Previous trials of Anthiphen had shown that it kills the worm in the intestine, where the worm disintegrates, and it also provokes peristalsis that expels the worm, so that search for the head is not necessary.

In Ituri 104 patients infected with *T. saginata* were given, in a single dose at 8 a.m., 0·5 gm. of Anthiphen per 16 English lb. body weight, or, if their nutritional state was not good, 0·5 gm. per 8 kgm., the maximum dose being 10 tablets, each containing 0·5 gm.

The worm was expelled by 96 (92%) of the 104 patients, and was expelled entire by 70% and in 3 or 4 pieces by the others. In 11% of the patients there was mild colic 2 hours after the dose. The 8 failures included 2 patients who escaped control.

The authors consider that Anthiphen is the ideal remedy, capable of reducing taeniasis in Ituri to a reasonably low level. It revives the hope of reducing also the incidence of the worm in cattle. *G. Lapage*

Voge, Marietta & Heyneman, D. **Development of *Hymenolepis nana* and *Hymenolepis diminuta* (Cestoda: Hymenolepididae) in the Intermediate Host *Tribolium confusum*.** *Univ. California Publ. Zool.* 1957, v. 59, No. 9, 549–79, 1 fig. & 8 pls. [19 refs.]

Tarczyński, S. O samodzielności gatunku *Echinococcus multilocularis* Leuckart, 1863. [**The Self-Dependence of the Species *Echinococcus multilocularis* Leuckart, 1863**] *Wiadomości Parazytologiczne*. Warsaw. 1958, v. 4, No. 2, 109–19, 5 figs.

The English summary appended to the paper is as follows:—

"The author discusses the history of investigations on the species *Echinococcus multilocularis* Leuckart. 1863 referring to the literature. He quotes morphological and biological data on the basis of which *Echinococcus multilocularis* Leuckart, 1863 may be considered as independent species."

[See this *Bulletin*, 1958, v. 55, 185.]

Larrieu. Mortalité et morbidité dues à l'ankylostomose dans trois agglomérations urbaines du cercle de Séguéla. [**Mortality and Morbidity due to Ankylostomiasis in Three Urban Areas of the Séguéla District, Ivory Coast**] *Bull. Méd. de l'A.O.F.* Dakar. 1957, Oct.–Dec., v. 2, No. 4, 411–16.

In the Séguéla District, Ivory Coast, ankylostomiasis is very common and is an important problem in urban areas of more than 1 to 2 thousand inhabitants. It is not related to age or sex and almost every faecal examination done in the dispensary of the District reveals eggs of *Ancylostoma duodenale*, often in large numbers. They were found in 174 of 281 examinations of stools of patients with digestive troubles, anaemia and oedema, but amoebic infections were found in only 22 of these and schistosomiasis in only 3. In the Touba subdivision eggs of *A. duodenale* were found in 523 out of 685 stool examinations and at Mankono-ville in 66 out of 90 (73·33%). In 1955, in Séguéla District, 1,235 cases of

ankylostomiasis were registered, this number having functional or clinical signs of the disease; 25 of these were treated in hospital.

The patients with moderate ankylostomiasis reacted perfectly to treatment; but the 25 hospital patients had: (1) severe anaemia, the average estimates in 14 patients at Séguéla being 2,440,000 erythrocytes per cmm. and 40% haemoglobin, the lowest record being 1,350,000 erythrocytes and 30% haemoglobin, with corresponding clinical signs; (2) digestive troubles, including severe diarrhoea and cachexia, followed by the deaths of 2 out of 3; (3) oedema, usually a constant symptom, which was often severe and was, in 2 patients, accompanied by signs of pellagra; (4) polyneuritis of the lower limbs in 2 patients; (5) cardiac deficiency in 1 patient; (6) retention of urine and an albuminuria of 3·50 gm. per litre in 1 patient; (7) pulmonary tuberculosis ending in the deaths of 2 patients. Several patients had mild pulmonary tuberculosis and remittent malaria.

In pregnant women ankylostomiasis may cause a predisposition to abortion and premature birth, increased risk of obstetric shock in women with severe infections, and a high proportion of congenital debility. Of 28 pregnant women treated at Séguéla, all with severe anaemia, 2 experienced abortion at 3 and 5 months; there were 9 premature births, one serious cardiac failure at the time of birth, 12 cases of congenital debility, the weight of the children being between 1,200 and 1,750 kgm., 5 children born dead, 7 others (premature) dying during the 10 days after birth, and 5 children born at term who died during the 10 days after birth. The sequelae of confinement lasted a long time and left the patients severely debilitated.

Treatment was given to 17 patients in hospital. Of the 3 remedies used, thymol was unsatisfactory. Oil of chenopodium, in the classic dose of 3 to 4 capsules [quantity not stated], was given to 14 patients and the average number of treatments needed to eliminate almost all the worms was 3, but massive infections needed 6. Tetrachlorethylene was given to 2 patients and with spectacular results. *G. Lapage*

See also p. 809, White *et al.*, **Effects of Iron Treatment of Anemia in a Tropical Area.**

Nitzulescu, V., Sorescu, A. & Panaitescu, D. Contribuţii la studiul condiţiilor necesare dezvoltării ouălor de *Ascaris* şi *Trichocefal.* [**Study of the Conditions necessary for the Development of** *Ascaris* **and** *Trichuris* **Eggs**] *Studii şi Cercetări Inframicrobiol., Microbiol. şi Parazitol.* 1956, July–Dec., v. 7, Nos. 3/4, 553–61. [13 refs.]

The following is a translation of the authors' summary:—

The authors studied the influence of humidity and temperature on the development of the eggs of *Ascaris* and *Trichuris*. In most experiments

they used cultures of eggs on agar plates: plain agar 0·2%; agar 0·2% and formol 2%; agar 0·2% and 0·1% sodium merthiolate; agar 2% and formol 2%. They also studied the development of the eggs of these worms on humid earth.

Their conclusions are as follows:—

1. At a temperature of 20°C. the eggs develop better than at 29°C. or 37°C.

2. Eggs on a substrate of greater consistency (2% agar) develop more rapidly than those on a less consistent substrate (0·2% agar).

3. A humidity of 100% is advantageous for the development of *Trichuris* eggs. A reduced humidity favours the development of *Ascaris* eggs.

4. The use of agar plates has considerable advantages in the study of the development of helminth eggs. *H. J. O'D. Burke-Gaffney*

Villella, J. B., Gould, S. E. & Gomberg, H. J. **Effect of Cobalt-60 and X-Ray on Infectivity of *Ascaris* Eggs.** *J. Parasitology.* 1958, Feb., v. 44, No. 1, 85–92, 9 figs. on 2 pls. [14 refs.]

"The effect of cobalt-60 was tested on development of unsegmented eggs of *Ascaris lumbricoides suum*, and of cobalt-60 and x-radiation on the ability of embryonated eggs to produce larval pulmonary infection in guinea pigs. After removal of their albuminoid outer coats, unsegmented *Ascaris* eggs were exposed to cobalt-60 and incubated for various periods at 30°C. Doses of 30,000 and 100,000 rep retarded development of embryos. Embryonated eggs seemed to be more sensitive than unsegmented eggs to radiation with cobalt-60.

"The observation of Graham, that the guinea pig is much more susceptible than the white rat to pulmonary larval infection with embryonated *Ascaris* eggs, was confirmed.

"A dose of 100,000 to 150,000 rep cobalt-60 applied to infective (embryonated) *Ascaris* eggs was necessary to prevent development of viable larvae in the lungs of the guinea pig. After a dose as high as 250,000 rep, some degree of pneumonitis was still produced following feeding of the eggs to guinea pigs.

"A dose of 100,000 roentgens (r) x-ray (245 Kv.) was effective in preventing larvae from developing in the lungs of guinea pigs."

Beaver, P. C. & Danaraj, T. J. **Pulmonary Ascariasis resembling Eosinophilic Lung. Autopsy Report with Description of Larvae in the Bronchioles.** *Amer. J. Trop. Med. & Hyg.* 1958, Jan., v. 7, No. 1, 100–111, 2 figs. [28 refs.]

The present report is based on observations before and after death of an adult Indian male in Singapore who died in status asthmaticus after

a 10-day illness which was tentatively diagnosed as eosinophilic lung. There was an eosinophilia of 37%. At autopsy numerous nematode larvae were demonstrated in the bronchioles. In the liver section there was extensive congestion and central necrosis of the lobules surrounded by a prominent zone of eosinophilic infiltration. In the lung the bronchioles were dilated containing mucopus with polymorphonuclear and eosinophilic leucocytes.

As regards the larva, 5 were found in 570 sections of selected lung tissue representing approximately 250 cmm. All were found in bronchioles 0·6 to 3 mm. in diameter. From computation of various larval segments the length is given as 1·8 mm., possibly more than 2·0 mm. The greatest width lay just behind the oesophageal bulb. It was 24 μ at the anterior tip of the oesophagus, 50 μ at the nerve ring, 65 μ at the oesophageal bulb, 70–75 μ in middle portion and 32 μ at the level of the rectum. The intestine was well developed and the anus situated 70 μ or more from the tip of the tail. The larva could be readily identified as belonging to the same group as *Ascaris lumbricoides*; it definitely differed from all other described species and it was nearly in every respect identical with the early fourth stage larva of *A. lumbricoides*, but, until it can be compared with a larva of equal size and known to be *A. lumbricoides*, there must remain some question about its identification.

Experimental infections in man as well as in experimental animals have shown that the larvae in their migration and development in the liver and lungs, cause extreme eosinophilia of the blood and tissues together with cough and pulmonary infiltration. The severity of the symptoms and tissue reaction is proportional to the size of the inoculum and degree of sensitization resulting from previous exposure. The symptoms resulting from such infections are transient because *A. lumbricoides* larvae which fail to migrate from the lungs or other tissues die in a few weeks. The phenomenon may well be Loeffler's syndrome. In ascariasis of swine under conditions producing continuous or frequent ingestion of infective eggs tolerance and a high degree of immunity are produced.

It would appear, therefore, as regards the eosinophilic lung, that the finding of *Ascaris* larvae is chiefly important in showing that it can be recognized, even in areas where the true eosinophilic lung is a common complaint among adult Indians, although in life the two conditions may be indistinguishable.

[Danaraj has collected much further evidence in support of the thesis that "tropical eosinophilia" is a distinct disease and probably brought about by some species of filarial worm of animal origin and not adapted to the human host (this *Bulletin*, 1957, v. 54, 1341, 1342). In other words, it is an example of "visceral larva migrans".]

Philip Manson-Bahr

Saif, M. **On the Single-Dose Treatment of Ascariasis with Piperazine Citrate.** *J. Egyptian Med. Ass.* 1957, v. 40, No. 8, 557–60.

After a brief reference to previous work on the establishment of an effective single dose of piperazine citrate for the treatment of *Ascaris* infection [this *Bulletin*, 1955, v. 52, 283; 1956, v. 53, 780, 1368] the author, from Cairo, describes his studies made to standardize a single curative dose which could be given to children and adults without any special precaution.

He used the drug both in syrup form and as tablets containing 0·5 gm. of the compound. The dose was given to fasting patients in the morning without previous preparation or subsequent purging. Stools were examined by a concentration method after one week and then on alternative days on 3 occasions. If the last 3 examinations proved negative, the patient was regarded as being cured. The doses were given to patients over the age of 9 years, irrespective of age or weight, and were given as 1- to 4-day courses in doses of 3 to 4 gm. for 1 to 4 days. The doses stated are calculated as the equivalent amount of piperazine hydrate. The results are tabulated as follows:—

Dose	*Days*	*Form*	*No. of cases*	*Neg.*	*Pos.*
3 gm.	4	syrup	10	10	–
4 gm.	2	tablets	4	3	1
3 gm.	2	syrup	16	14	2
4 gm.	1	tablets	11	9	2
3 gm.	1	tablets	11	8	3
3 gm.	1	syrup	34	32	2

No side effects were noted.

It appears, from these small numbers, that the single daily dose of 3 gm. in syrup form was nearly as effective as the 4-day course. The syrup was found easier to administer: its superiority is presumably due to its more rapid action than that of the tablets when given on an empty stomach.

The author notes the absence of side reactions, although these had been reported by others [*ibid.*, 1956, v. 53, 1368, 1369]. The single dose treatment thus appears to be both effective and safe.

H. J. O'D. Burke-Gaffney

ERRATUM

In the abstract of the paper by Sadun *et al.* in this *Bulletin*, 1958, v. 55, 187, these authors were represented as stating that *Echinococcus multilocularis* has been reported in wolves and moose in Minnesota. This is incorrect. They were referring to Riley [*ibid.*, 1940, v. 37, 587] who stated that *Echinococcus* has been found in wolves and moose in Minnesota, but did not specify what species of *Echinococcus* has been found.

Gabinus, O., Stigmarker, Eva & Jonasson, G. Tropiska sjukdomar, särskilt filarioser, i Sverige. [**Tropical Diseases in Sweden, with special reference to Filarial Infections**] *Nordisk Med.* 1958, Mar. 27, v. 59, No. 13, 461–6, 10 figs. [10 refs.]

The English summary appended to the paper is as follows:—

"Persons from all parts of Sweden who returned from the tropics with tropical diseases have been examined at the Hospital for Infectious Diseases, Jönköping. From March 1, 1955 to November 1, 1957 a total of 156 patients were examined. Of tropical diseases we found malaria in 16 cases, amebiasis in three, including one case of amebic liver abscess, and filariasis in 41 cases. The last-named comprised loiasis (19 cases), *A. perstans* infections (20 cases), onchocerciasis (one case) and *W. bancrofti* infection (one case). During treatment with hetrazan we observed in each case a very marked elevation of the eosinophils in the blood. Of interest is that during the first day of treatment there was a depression of the eosinophils before the elevation started. In some cases of loiasis we found that the eosinophils ran a parallel course with the rhythmic appearance of the microfilariae."

South Pacific Commission. Nouméa, New Caledonia. Enquête épidémiologique et entomologique sur la filariose de Bancroft en Nouvelle-Calédonie et Dépendances. [**Epidemiological and Entomological Study of Bancroftian Filariasis in New Caledonia and Dependencies**] [Lacour, M. & Rageau, J.]. *Technical Paper No. 110.* 1957, Aug., 24 mimeographed pp., 1 map. [Numerous refs.]

At the conference on filariasis in the South Pacific in 1951, at Papeete, an investigation in New Caledonia was suggested since the non-periodic form occurring there was transmitted by *Aëdes vigilax* (an Australian species) and not by members of the more usual *scutellaris* group as elsewhere in the Eastern Pacific, and because the clinical manifestations were so trivial compared with non-periodic infections in the Eastern Islands.

The investigation was done in 1955–56. The clinical changes are very mild and are limited to glandular swellings, lymphangitis and hydrocele; elephantiasis is rare. The microfilariae are non-periodic, and morphologically indistinguishable from those of *W. bancrofti.* The incidence of microfilariae in the blood is higher in men than in women, possibly because the men spend more of their time than the women in the swamps.

Man-biting mosquitoes are limited to *Aëdes* (*Stegomyia*) *aegypti*, *A.* (*Aëdimorphus*) *vexans*, var. *nocturnus*, *A.* (*Ochlerotatus*) *vigilax*, *A.* (*Mucidus*) *alternans*, *A.* (*Finlaya*) *notoscriptus*, *Culex pipiens fatigans*, *C. annulirostris*, *C. sitiens* and *Taeniorhynchus* (*Coquillettidia*) *xanthogaster*—all Australian species. Developing filarial infections have been found in the thoracic muscles of *A. vigilax* (in 25 of 1,109 dissected),

Culex fatigans (in 1 of 233), *C. sitiens* (in 1 of 612) and in *T. xanthogaster* (in 1 of 147). The Malpighian tubules of one *C. annulirostris* contained many developing larvae of *D. immitis*. The infection rate in *A. vigilax* in different areas, *e.g.* coast and hinterland, is related to the incidence of the microfilariae in the blood of man.

Filariae have been found in dogs (*D. immitis*), in fowls (*Oxyspirura mansoni*) and in cattle (probably *Setaria cervi*), and birds may be infected. All may prove a source of confusion in identifying the developing larvae in their vectors.

In 1898 T. L. Bancroft attempted the experimental infection of *A. vigilax* by periodic *W. bancrofti* in Australia, and in 1951–52 Kerrest showed that it could support the development of the non-periodic form in New Caledonia. In 1954 Iyengar [this *Bulletin*, 1955, v. 52, 468] raised the infection rate in wild mosquitoes fed on volunteers from 5% to 57% and with Menon [*ibid.*, 1956, v. 53, 1463] raised the infection rate to 94%. Backhouse and Woodhill [*ibid.*, 1955, v. 52, 561] showed in 1954 that the non-periodic form from New Caledonia would also develop in the *scutellaris* group from Fiji.

Iyengar has suggested that the long flight range of *A. vigilax* with consequent dispersal of infection may render intense infections unlikely, thus producing trivial clinical manifestations. *W. E. Kershaw*

Wharton, R. H. **Studies on Filariasis in Malaya: The Efficiency of *Mansonia longipalpis* as an Experimental Vector of *Wuchereria malayi*.** *Ann. Trop. Med. & Parasit.* 1957, Dec., v. 51, No. 4, 422–39, 4 figs. [21 refs.]

Wild caught mosquitoes were fed at night on human *W. malayi* carriers. Microfilarial counts were made just before, and just after, each feed and the mosquitoes were dissected 10½ or more days later. A direct relationship was found between the density of microfilariae in the peripheral blood at the time of the blood meal, and the average number of larvae found per mosquito. The number of larvae per mosquito was approximately 5 times the number of microfilariae per cmm. of peripheral blood [see also this *Bulletin*, 1958, v. 55, 294]. When few microfilariae (0·025–1·7 per cmm.) were present in the blood films, only 10 to 90% of the mosquitoes became infected, whereas when the concentration of microfilariae was higher (1·7–25·0 per cmm.) all the mosquitoes became infected. The author concludes that there can be no non-infective microfilarial level in the blood other than zero.

There was no evidence of escape of infective larvae from the mosquitoes during the period of 10½ to 15½ days after feeding. Mosquitoes dissected after 16 days were found to contain significantly fewer larvae than those dissected before this time, but it is possible that this difference may be due to the greater mortality of the more heavily infected mosquitoes after 16 days. Mosquitoes fed on *W. malayi* carriers with counts of 2·3

microfilariae per cmm. survived as well as mosquitoes fed on uninfected persons, 50% being dead by about the 18th day. Mosquitoes fed on carriers with counts of 10·7 microfilariae, or more, per cmm. survived normally up to 8 days after the feed, but died rapidly after this, 50% being dead by about 10½ days. Also, when mosquitoes were fed on carriers with 10 or more microfilariae per cmm., a slowing down of larval growth was noticed, although there were also differences in the rate of growth of larvae in different individuals of *M. longipalpis* fed at the same time. Maximum numbers of infective larvae were obtained when the mosquitoes were fed on carriers with blood counts of 3 to 11 microfilariae per cmm. of peripheral blood. The *W. malayi* carriers used ranged in age from 14 to 33 years and included one female. There was no evidence of differences in the viability of microfilariae from different carriers, despite some having taken prior treatment with diethylcarbamazine.

The results obtained in this study are compared with those obtained by other workers on the uptake of *Wuchereria* and *Dirofilaria* by mosquitoes, and agree principally with the work of Rosen on *W. bancrofti* in *Aëdes polynesiensis* [*ibid.*, 1955, v. 52, 1112]. *B. R. Laurence*

Lebied, B. Iconographie de l'évolution intrasyncytiale de *Loa loa* chez *Chrysops*. (Note préliminaire sur les facteurs, interne et externe, déterminants du cycle évolutif des Filariata (Scrjabin) chez leurs hôtes intermédiaires.) [**Graphic Description of the Intrasyncytial Development of** *Loa loa* **in** *Chrysops*] *Ann. Soc. Belge de Méd. Trop.* 1957, Oct. 31, v. 37, No. 5, 641–5, 11 figs. on 2 pls.

In this preliminary note on the development of *Loa loa* in *Chrysops dimidiata* and *Chrysops silacea* the microfilariae, after ingestion, are said to leave the gut, and, after reaching the haemocoele, are then surrounded by fatty cells which fuse producing polynucleate cells. In this process the fatty cells are active and the microfilariae are passive. This process is regarded as being similar to that occurring in the development of *Onchocerca volvulus* in the thoracic muscles of *Simulium*, for this tissue can be regarded as a pre-existing syncytium.

It is suggested that the specific localization in syncytium is of significance in the development of the filariae in their intermediate hosts.

[The appearances described in this preliminary note are capable of an alternative explanation.] *W. E. Kershaw*

Parekh, J. G. & Kulkarni, D. R. **A Clinical and Therapeutic Study in Dracontiasis (Guineaworm) Infection.** *J. of J.J. Group Hosps. & Grant Med. College.* Bombay. 1958, Jan., v. 3, No. 1, 22–39, 1 map & 1 fig. [25 refs.]

The incidence of dracontiasis in India is stated to be anything from 5 to 25 million. The greatest incidence is undoubtedly in the extreme

south and west. In prevention the conversion of step-wells into draw-wells has first priority. By the addition of cyclops-eating fish such as *Gambusia*, *Berbus* and *Thermalys* to infected water and by the use of chemicals like DDT efforts are made to keep this infection in check. It is found, too, that aqueous extracts of the leaves of the bamboo tree have a lethal effect on the cyclops and on the guineaworm larvae owing to the presence of cyanglucosides and other toxic principles. The best method is, of course, by the supply of filtered water for drinking purposes, but this is not possible immediately.

Originally there were some 880 cases in the series presented, but of these 150 could not be followed up. The following complications were noted: cellulitis (44), abscess (31), cyst formation (14) (sometimes containing worm fragments), arthritis and synovitis (10), chronic sinus or ulcer (196). No examples of osteomyelitis were encountered. The majority of cases were found in young persons between the ages of 15 to 30 years. The infection is not frequent under the age of 5.

The distribution of lesions in one series of cases quoted was as follows:—

feet and ankles	50·1%
legs	27·1%
knees	4·9%
thighs	10·4%
upper limbs	4·5%
trunk	2·7%
buttocks	0·3%

In addition to local measures the following treatments were tried out: minced tender roots of the banyan tree and a dried powder preparation known as Draculan; numerous other proprietary preparations were used. Hetrazan (diethylcarbamazine) was given to 6 patients of whom 3 were cured. None of the drugs which were tried had a curative, palliative or preventive effect and the results were no better than when a simple placebo was used.

The clinical features of the disease are presented, and these together with the results of various treatments, are discussed and set out in several tables.

[See also this *Bulletin*, 1957, v. 54, 1446.] *Philip Manson-Bahr*

Greenstein, N. M. & Steinberg, D. **The Prompt and Effective Response of Trichinosis to Corticotropin.** *J. Dis. Children.* Chicago. 1958, Mar., v. 95, No. 3, 261–9. [21 refs.]

"Trichinosis is a common disease, frequently disabling and, at times, fatal. It is often undiagnosed, unrecognised, and unreported.

"There does not exist at present a specific method of treatment.

"Although the number of reported cases is small, corticotropin (ACTH) and cortisone have been found extremely successful in the treatment of the signs and symptoms of the disease and in the control of such serious complications as encephalopathy and myocarditis.

"This is the first report of the successful use of corticotropin in trichinosis in children under 12 years of age.

"The use of large doses of corticotropin in a short course is recommended."

DEFICIENCY DISEASES

WILLS, V. G. & WATERLOW, J. C. **The Death-Rate in the Age-Group 1–4 Years as an Index of Malnutrition.** *J. Trop. Pediatrics.* London. 1958, Mar., v. 3, No. 4, 167–70. [12 refs.]

"The infant mortality rate is widely used as an index of the state of public health. Such an index is valuable because it is based on a period of life when the danger of death is relatively high. However, the period of greatest danger is not necessarily the same in all countries and all environments. It is suggested that malnutrition tends to raise morbidity and mortality predominantly in the age-group 1 to 4 years. The mortality rate in this age-group might therefore be useful as an index of the nutritional status of a country."

[This is a useful article and most people would accept its main conclusions. It is true that in the developing countries the death rate is very high in the younger age-groups. To compare the percentage of deaths in various age-groups is a valuable method of comparison, and can be used in large or small communities. For instance, in England and Wales the deaths under 5 years amount to 5% of the total, in Malaya to 41%, and in Mexico to nearly 50% (CREW, *East African Med. J.*, 1957, v. 34, 487). To reckon the deaths in the 1–4 age-group per 1,000 live births does not give a true picture. Where there is a high mortality in the 0–1 age-group, there will be fewer children at risk in the 1–4 age-group. The Demographic Year Book gives the 0–1 deaths per 1,000 live births, but in other age-groups the deaths are given per 1,000 living of that group.

Most observers would agree that the majority of children in the developing countries are malnourished when they die. How far this condition is due to dyspepsia, gastro-enteritis, parasitic and other infections it is impossible to say, even at autopsy—as the authors point out [see also this *Bulletin*, 1957, v. 54, 468]. Careful long-term observations are badly needed in order to discover the background of the malnutrition.

The authors believe that errors in death registration apply equally to the age-groups 0–1 or 1–4. Have they never heard, in any language, the remark "He was so little when he died, I did not trouble the Government to register him"? The younger the child the more likely is he to escape registration.

On p. 168 there is a reference to WILLS, 1957—but no source is given.]

Cicely D. Williams

Masseyeff, R., Perissé, J. & Serre, A. Considérations méthodologiques sur les enquêtes alimentaires en Afrique Noire. A propos de quelques enquêtes récentes parmi les populations de l'Union française. [**Methodological Observations on Dietetic Surveys in Africa. Some Recent Surveys among the Peoples of the French Union**] *Bull. Inst. Nat. Hyg.* Paris. 1957, Oct.–Dec., v. 12, No. 4, 737–65, 1 map & 6 graphs.

The authors review a series of dietetic surveys that have taken place in French West Africa. They point out a number of difficulties in applying theoretical standards and in assessing the value of such surveys when there exist great variation and numerous relatively unknown factors which affect nutrition.

They conclude that such surveys should be accompanied by vital statistics, by growth studies, and by clinical investigations as infections and infestations play an important part. They quote some figures produced by the *Organisme de Recherches sur l'Alimentation et la Nutrition en Afrique* giving wide variations in childhood mortality. In some places the infant mortality rate may be as high as 340 per 1,000 while over 40% of the children may die before the age of 14.

[The article gives some interesting tables. It emphasizes some important aspects of nutrition. A great deal of money and effort can be spent on surveys of questionable value.] *Cicely D. Williams*

Uganda Protectorate. **An Interim Report of the Standing Advisory Committee on Nutrition. Nutrition Surveys. A Comparison of the Health of Six Villages consuming Different Types of Food** [McFie, J., Med. Officer (Nutrition)]. 49 mimeographed pp., 16 figs. & 2 maps (1 coloured loose leaf). [24 refs.] 1956.

This survey was carried out on 1,057 people, the entire population of 6 small villages in different parts of Uganda. The author, with the assistance only of interpreters, assessed: (1) the diets of the villagers by simple questioning, (2) the population structure, birth rates and fertility rates, (3) the growth rates of the children, (4) the incidence of infectious diseases (malaria, yaws and respiratory infections), (5) the incidence of deficiency diseases, (6) levels of haemoglobin in the blood and serum proteins. This is a formidable assignment for a one-man team. The report has been written discursively, but with style. The reader is left with the impression that these African villagers are not badly off. They get enough fruit and vegetables to supply their needs for vitamins. The protein supply is uncertain as cassava and other root crops contribute largely to some of the diets. As a result a few children were found with kwashiorkor and the serum protein levels were a little low in the young children. But growth rates were for the most part satisfactory, though tending to slow down after the age of 12. Malaria remains an important

disease with high spleen rates and low haemoglobin levels in the children under 5 in some villages. Yaws is also present.

The most interesting part of the report is the section on vital statistics. In two of the villages the number of children was insufficient to maintain the population at the present level. This was in part due to high mortality rates, but also the fertility rates of the women in these villages were low. The figures on which these calculations were based were too few for firm conclusions to be drawn, but it is suggested that the collection of population statistics could be extended and that this would be a practical way of keeping a check on the general health of the people.

This is an interim report of a standing committee on nutrition. The data collected certainly justify the survey and it is to be hoped that opportunities will become available for obtaining information on some of the points on an altogether larger scale. *R. Passmore*

Berry, F. B. & Schaefer, A. E. **Nutrition Surveys in the Near and Far East. Report of the Interdepartmental Committee on Nutrition for National Defense.** *U.S. Armed Forces Med. J.* 1958, Jan., v. 9, No. 1, 91–106, 4 figs.

In 1956 and 1957 large teams from the U.S.A. carried out clinical, biochemical and dietary surveys among members of the armed forces of Korea, Iran, Pakistan, Philippines, Turkey and Libya. This paper gives a background of these surveys and a brief summary of some of the results. *R. Passmore*

Miller-Cranko, J. & Gelfand, M. **A Clinical Description of the Main Nutritional Disorders encountered in the Salisbury Native Hospital in a Series of 54 Consecutive Cases studied in 1954.** *Central African J. of Med.* 1958, Jan., v. 4, No. 1, 16–22, 12 figs. [11 refs.]

The 54 cases consisted of 22 pellagra, 13 vitamin A deficiency, 12 vitamins A and B deficiency, 6 "pellagroid" or dry skin and 1 scurvy. In the majority of patients there was overlapping and the condition was in fact a mixture of defects. Almost all patients have malaria and schistosomiasis, and a number also have hookworm. Those with tuberculosis, nephritis, cardiac and hepatic disorders are not included in this study. The authors agree with Trowell that kwashiorkor may be present in adults, but no cases are included. There are detailed accounts of signs and symptoms.

The standard weekly Government rations for Africans consist of 10½ lb. mealie meal (or sorghum, munga or rice), 2½ lb. meat, 2 lb. shelled groundnuts, 1 lb. beans, 2 lb. fresh vegetables, 7 lb. sweet potatoes, ½ lb. salt.

The food is given out ready cooked. It is impossible to know whether

in fact this diet has been provided or consumed and for how long. Most patients attend late in disease.

[The article includes good photographs of text-book cases.]

Cicely D. Williams

Thonnard-Neumann, E. Klinische Beobachtungen zu Klima und Ernährung in Kolumbien. [**Clinical Observations on Climate and Nutrition in Colombia**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1957, v. 8, No. 3, 367–76.

The English summary appended to the paper is as follows:—

"Tropical heat and moisture of the Atlantic coast of Colombia cause health disorders among the natives and render the climatic adaptation of immigrants precarious. In hard-working people, the loss of water by perspiration is apt to upset the peripheral circulation and electrolyte equilibrium of body fluids. The functions of the hypothalamus vegetative system, endocrine glands and liver are disturbed by insufficient thermostatic adjustment.

"Often enough the nourishment is rich in carbohydrates and fats but short of proteins, minerals and vitamins; among the poor it is also insufficient in calories. The deficiency diseases observed delineate a lack of proteins, iron, calcium, a- and b-vitamins. Infants and juveniles often show the syndrome of combined deficiency (Kwashiorkor), body weight is subnormal and growth retarded. Physical and mental capacities of adults are diminished and mild forms of liver ailments prevalent.

"The Colombian government is aware of the situation and has created centers for nutritional research."

Srikantia, S. G. **Ferritin in Nutritional Oedema.** *Lancet.* 1958, Mar. 29, 667–8. [16 refs.]

In 7 patients (5 children with kwashiorkor and 2 adults with nutritional oedema) ferritin [an iron-protein complex] was demonstrated in the venous blood on admission to hospital and was not detected 10 to 30 days later when the oedema had disappeared. The ferritin was assayed biologically by the mesoappendix test of Zweifach. Ferritin is known under certain circumstances to have an antidiuretic action; ferritinaemia might thus be responsible for the oedema in these patients. *R. Passmore*

Davis, Ruth A. & Wolf, A. **Infantile Beriberi associated with Wernicke's Encephalopathy.** *Pediatrics.* Springfield, Ill. 1958, Mar., v. 21, No. 3, 409–20, 6 figs. [40 refs.]

"An infant, 5½ months of age, died after a brief acute illness characterized by irritability and somnolence leading terminally to coma, and by excessive sweating, abdominal distension, tachypnea and tachycardia.

Acidosis and azotemia were marked. He was found at necropsy examination to have pathologic findings compatible with both beriberi and Wernicke's encephalopathy.

"Investigation of the dietary history and analysis of the formula fed [to] the patient confirmed the suspicion of deficient intake of thiamine.

"This is the first case report in which the coexistence of these two pathologic conditions in a child proven to have had an inadequate diet, has been documented. It lends further support to the thesis that Wernicke's encephalopathy is caused by nutritional deficiency.

"The importance of vitamin supplementation of restricted diets used in the therapy of infantile eczema is emphasized."

HILL, K. R., STEPHENSON, Cynthia F. & FILSHIE, I. **Hepatic Veno-Occlusive Disease produced experimentally in Rats by the Injection of Monocrotaline.** *Lancet.* 1958, Mar. 22, 623. [14 refs.]

Monocrotaline is one of the pyrrolizidine group of alkaloids isolated from several species of *Crotalaria* (Leguminosae). When injected intraperitoneally into rats (dose 91·7 mgm. per kgm.), about a quarter of the animals developed veno-occlusive disease of the liver within 10 days.

[See this *Bulletin*, 1958, v. 55, 205.] *R. Passmore*

HAEMATOLOGY

MOORE, R. **The White Blood Cell Count in the Indigenous People of East Africa.** *J. Trop. Med. & Hyg.* 1958, Mar., v. 61, No. 3, 70–72.

This paper documents the widespread impression that the total and differential leucocyte counts in indigenous Africans differ from the accepted standards. Three places in East Africa at different altitudes were chosen for surveys, and all counts were made by the author between 8.30 and 10 a.m., on subjects over 14 years old. The main findings are given below:—

Place	*Kikale* (*Tanganyika*)	*Mwanza* (*Tanganyika*)	*Eldoret* (*Kenya*)
Altitude	50 ft.	3,721 ft.	6,778 ft.
Leucocyte count			
Mean:	6,869/cmm.	6,006/cmm.	5,860/cmm.
Standard error:	223	113	153
Differential			
Neutrophils	37·9%	36·3%	40·8%
Lymphocytes	44·6%	47·3%	47·0%
Monocytes	7·5%	5·0%	7·2%
Eosinophils	9·6%	11·1%	4·8%
Basophils	0·1%	0·1%	0·07%

A fuller table, and a statistical analysis, are given in the original. The total count, low in all three places, was found to fall significantly as altitude increased. The eosinophil count at Eldoret was significantly lower than elsewhere, and though all three populations were heavily parasitized Eldoret differed from the other places in that hookworm was absent and tapeworm common. The monocyte count at Mwanza was significantly lower than at Kikale and Eldoret, but no explanation is given. The author comments that in all localities there was a lymphocytosis. [But only at Kikale did the mean absolute lymphocyte count (3,065/cmm.) exceed, and that by a very narrow margin, the accepted upper limit; moreover there was no significant difference between the mean lymphocyte counts at the three places. Since no new explanation is offered for the relative lymphocytosis, a constructive approach might be to consider why the granulocyte count is diminished.]

Alan B. Raper

Cotter, Helen, Kariks, J. & Walsh, R. J. **Haemoglobin Values of some Native Inhabitants of Bougainville, New Guinea.** *Med. J. Australia.* 1958, Jan. 11, v. 1, No. 2, 29–32, 2 figs.

The haemoglobin values of 1,249 male and 1,095 female indigenous inhabitants of Bougainville, New Guinea, were measured by a method strictly checked for accuracy. Measurement was done at Sydney, but experiment showed that the values given by individual samples, citrated and with penicillin and streptomycin added, did not vary significantly after days of keeping at room temperature.

The mean value in adult males was 13·09 gm.%, compared with 15·71 gm.% in white Australian males. In adult females the mean value was 11·97 gm.%, compared with 13·89 gm.% in white Australian females. Scatter was large, respective standard deviations being 1·92 and 1·77. A table gives values for quinquennial age-groups.

There is no evidence to support the suggestion that the low haemoglobin values are a physiological racial characteristic. They must therefore be regarded as a manifestation of tropical abnormality, probably of multifactorial aetiology; the importance of various contributing agents can be determined only by eliminating each separately and observing the response. Of possible agents, malaria is holoendemic, hookworm is prevalent and protein deficiency is a feature of the diet. Protein deficiency is thought to be unlikely as a major cause of low haemoglobin since (i) kwashiorkor has been found in a New Guinea area in which haemoglobin values were greater [this *Bulletin*, 1957, v. 54, 861], (ii) in the Wabag area of the New Guinea highlands, altitude polycythaemia is marked in spite of a low protein intake, (iii) the low haemoglobin values in Bougainville are associated with high plasma protein values, especially high gamma globulin values. Blood and intestinal parasites are the most likely aetiological agents.

B. B. Waddy

HUNT, J. A. & INGRAM, V. M. **Allelomorphism and the Chemical Differences of the Human Haemoglobins A, S and C.** [Correspondence.] *Nature*. 1958. Apr. 12. v. 181. 1062–3. 1 fig. [11 refs.]

LIVINGSTONE, F. B. **The Distribution of the Sickle Cell Gene in Liberia.** *Amer. J. Human Genetics*. 1958. Mar., v. 10. No. 1. 33–41. 1 fig. [15 refs.]

"Data are presented on the distribution of the sickle cell gene in Liberia. These data indicate a northwest-southeast cline in the frequency of the sickle cell trait. In the extreme northwest on the Sierra Leone border there is 20 per cent of the sickle cell trait, and the frequency decreases gradually to about 12 per cent in central Liberia. There is then an abrupt decline to 4 to 7 per cent among the coastal tribes and to 2 per cent among the tribes of the interior, and then a more gradual decrease to almost zero per cent in southeastern Liberia. The evidence seems to indicate that this cline is due to the recent advance of the sickle cell gene through Liberia."

ATA, A. El-H. A. **"Sickle Cell Anaemia".** With a Case Report. *J. Egyptian Med. Ass.* 1957. v. 40. No. 11. 815–30. 3 figs. on 2 pls. [30 refs.]

The second case reported in Egypt. See this *Bulletin*, 1951, v. 48, 831.

MENÉNDEZ CORRADA, R. **Hemoglobin Survey in San Patricio Hospital. Filter Paper Electrophoresis of the Hemoglobin of 500 Patients.** *Boi. Asoc. Med. de Puerto Rico*. 1957. July. v. 49. No. 7. 262–7. 2 figs. [13 refs.]

The author has examined the haemoglobin composition of 500 patients admitted to the San Patricio Veterans Administration Hospital in San Juan, Puerto Rico. Originally he had intended to perform this survey only on the "coloured" patients, but he soon changed his mind when he met the difficulty in deciding who was "coloured", and most of the study has therefore been made on unselected patients. They did not, however, include women or children, all the patients being adult men, and the human sample investigated was therefore not representative of the general population. Abnormal haemoglobins were found in 13 of the 500 men: 8 AS, 1 SS, 2 AC, and 2 SC. *H. Lehmann*

CRONE, R. I., JEFFERSON, S. C., PILEGGI, V. J. & LOWRY, E. C. **Gross Hematuria in Sickle-Cell Trait. A Report of Eight Cases.** *Arch. Intern. Med.* 1957. Oct., v. 100. No. 4. 597–603. [20 refs.]

"Eight cases of gross hematuria associated with electrophoretically proven sickle-cell trait are presented.

"In view of negative findings implicating any other etiological cause,

the hematuria is most likely due to pathological changes secondary to the hemoglobin abnormality.

"A brief review of the literature would indicate that gross hematuria associated with the sickle-cell trait (S-A) and other sickle-cell abnormal hemoglobin combinations, particularly S-C, is undoubtedly commoner than generally realized.

"The pathological mechanisms involved in the causation of the renal bleeding are not completely understood.

"Treatment in general would appear to be mainly supportive, with nephrectomy reserved as a life-saving measure when all other measures have failed to stop the bleeding."

See also p. 727, VANDEPITTE & DELAISSE, Sicklémie et paludisme. Aperçu du problème et contribution personnelle. [**Sicklaemia and Malaria. Appreciation of the Problem and a Personal Contribution**]

VANDEPITTE, J. & CATRYSSE, R. Hémoglobine D dans une famille congolaise. [**Haemoglobin D in a Congolese Family**] *Ann. Soc. Belge de Méd. Trop.* 1957, Oct. 31, v. 37, No. 5, 697–702, 2 figs. (1 on pl.) [16 refs.]

In 1956 Vandepitte reported the discovery of the haemoglobin D trait in an adult African from the extreme north-east of the Congo [this *Bulletin*, 1957, v. 54, 342]. This article gives full details of this man as well as the results of an examination of his family. In addition there is a most valuable review of the literature on haemoglobin D.

The only haematological abnormality in the propositus was an increased resistance of the red cells to lysis by hypotonic saline solution. Haemoglobin D was also found in his mother and in one brother and sister, respectively. The family belonged to the Logo tribe. The Logo are not Bantu but belong to the Sudanese who have immigrated into the Congo and speak a Nilotic dialect. The reproduction of the electrophoretic strip shows that the abnormal haemoglobin of the propositus moved at *p*H 8·6 rather faster than haemoglobin S. [In fact, in the eyes of the abstracter its position resembles that of the recently described haemoglobin L.] The diagnosis of haemoglobin D was confirmed by Dr. H. ITANO, who originally discovered haemoglobin D. He is quoted as saying "The blood sample shows a solubility and electrophoresis pattern which is consistent with Hb D or something very similar to it. The proportion of Hb D is lower than found in the Hb D family in our clinic. . . ."

H. Lehmann

CHERNOFF, A. I. **The Hemoglobin D Syndromes.** *Blood.* 1958, Feb., v. 13, No. 2, 116–27, 6 figs. [20 refs.]

This article elaborates a previous one by the same author [this *Bulletin*, 1957, v. 54, 212]. He had found a number of examples of

haemoglobin D in Negroes in the St. Louis area and he has now added to these a white family in Durham, North Carolina, with haemoglobin D. The findings in one of his subjects suggested homozygous haemoglobin D disease. Unfortunately the parents could not be examined and there were no children, but all 3 siblings were haemoglobin D trait carriers.

From the haematological standpoint homozygous haemoglobin D disease may be characterized as a very mild haemolytic anaemia with microcytes and normochromic red cells and many target cells on the stained blood film. The author poses the question whether the Negroes in his study have inherited the gene for haemoglobin D from an admixture with American Indian blood. To date, however, no such focus in American Indians has been discovered, possibly because extensive surveys have not yet been made. *H. Lehmann*

Nagaratnam, N., Wickremasinghe, R. L., Jayawickreme, U. S. & Maheson, V. S. **Haemoglobin E Syndromes in a Ceylonese Family.** *Brit. Med. J.* 1958, Apr. 12, 866–8, 2 figs. [15 refs.]

This article describes a family in Ceylon of Sinhalese extraction in which the father carried the haemoglobin E trait. 2 children, who were also carriers of the haemoglobin E trait, suffered from a severe anaemia. They are described in detail. Of their 3 siblings 2 were normal and one was both a haemoglobin E trait carrier and anaemic. The anaemia is diagnosed as thalassaemia-haemoglobin-E disease.

In the original description of this haemoglobinpathy from Siam and in the numerous cases described since there was always a complete absence of haemoglobin A, and the only two haemoglobins present were haemoglobin F—always well above 20%—and haemoglobin E. Here haemoglobin A was found in one of the children, in one no F was present at all, and in the other it amounted to only 5%. Neither parent showed signs of thalassaemia, except that the mother's red cells " were found to be resistant to lysis in distilled water ".

Under these unusual circumstances one would have hoped to see the claim that the 2 patients carried both a haemoglobin E gene and a thalassaemia gene much more thoroughly established. It is, for instance, typical for thalassaemia to present the unusual combination of hypochromia of the red cells together with a high or at least normal serum iron level. No serum iron estimations are recorded, and the reader might well think that the heightened resistance of the mother's red cells against lysis by distilled water was due to the microcythaemia of iron deficiency and not of thalassaemia. Iron deficiency anaemia is very common in Ceylon. Similarly, in both children there is so much evidence of liver damage that one wonders whether there could not be a causal connexion between this and the anaemia. Lastly, in a previous survey of people from Ceylon it was specifically stated that haemoglobin E was found there among the Veddas but not among the Sinhalese. In the present

paper it is stated that haemoglobin E is found both among Veddas and Sinhalese. One would like to know whether this means that haemoglobin E has occasionally been seen in the odd Sinhalese, or whether a new survey has established that there exists in fact among the Sinhalese a significant incidence of haemoglobin E. *H. Lehmann*

Vella, F., Paramathypathy, K. & Dourado, H. **Haemoglobin E-Thalassaemia in Singapore.** *Proc. Alumni Ass., Malaya.* 1957, Dec., v. 10, No. 4, 313–21, 3 figs. [37 refs.]

This article describes in considerable detail 2 patients with haemoglobin-E-thalassaemia seen in Singapore. Both were Malaysian children. There is a useful assembly of references on haemoglobin E.

H. Lehmann

Lehmann, H., North, A. & Staveley, J. M. **Absence of the Diego Blood Group and Abnormal Haemoglobins in 92 Maoris.** [Correspondence.] *Nature.* / 1958, Mar. 15, v. 181, 791–2.

After a brief review of the findings of some abnormal haemoglobins and the Diego blood group in different ethnological groups, the authors refer to previous work in which no abnormal haemoglobins were found in 166 Australian aboriginals [this *Bulletin*, 1956, v. 53, 647] and 56 Melanesians.

They have now examined 92 Maoris: 65 were not first-degree relations, but it is likely that some of these were related by intermarriage. All were examined for haemoglobin E and H and other abnormal haemoglobins detectable by the sickling test or by electrophoresis. They were also examined for the Diego blood group. 84 were examined for evidence of thalassaemia. All these examinations were completely negative.

These findings distinguish the Maoris examined from North and South American Indians so far examined, and from Siamese, Burmese and Malaysians. The findings do not distinguish them clearly from Indonesians, Dyaks and other South Asian Mongoloids. Haemoglobin E and the Diego blood group have been found at low frequency in some of these populations, but it is more likely that this is due to mixing with neighbours having these characters.

It is hoped to extend these studies. *H. J. O'D. Burke-Gaffney*

Vella, F., Wells, R. H. C., Ager, J. A. M. & Lehmann, H. **A Haemoglobinopathy involving Haemoglobin H and a New (Q) Haemoglobin.** *Brit. Med. J.* 1958, Mar. 29, 752–5, 8 figs. [22 refs.]

Once again, investigation of a hypochromic anaemia resistant to iron and worming has led to the detection of a new haemoglobin variant, this time in a Chinese male of 24 years. Clinically the case resembled thalassaemia minor, and the haemoglobin level could not be raised above

about 11 gm./100 ml. by any form of treatment. However, the mean corpuscular volume was 90·2 $c\mu$, supravital staining showed inclusion bodies in the red cells such as occur in the presence of haemoglobin (Hb) H, and the Hb A_2 fraction was found not to be increased. Electrophoresis on paper demonstrated two Hb components; the smaller fraction (about 20%) moved to the anode at *p*H 6·5, and was thus identified as Hb H. The larger fraction took up a position, at *p*H 8·6, between Hb A and Hb S; it was not resistant to alkali, and it separated from Hb A in artificial mixtures, and therefore was not Hb F. Careful comparison with Hb L and Hb G showed that it moved a fraction faster than either of these, when appropriate mixtures were examined. These findings were confirmed when it was found that the new Hb could be separated from Hb L in a mixture of the two on an ion-exchange resin, and from Hb G on electrophoresis in agar at *p*H 6·2. The solubility of the new Hb (after the Hb H in the natural mixture had become denatured) was 0·65 gm. per litre in 2·58 M phosphate—closely resembling that of Hb G.

The authors remark on the apparent resemblance of the new Hb to one examined by Schwartz *et al.* (*Blood*, 1957, v. 12, 238 [this *Bulletin*, 1957, v. 54, (869)]) which had a mobility very close to that of Hb G, and which the American authors did not feel justified in distinguishing from the latter. Since there are three Hb variants as yet un-named (from Liberia, Indonesia and Texas), with which the new Hb has been compared and from which it differs, letters are reserved for these and the new variant is named Q.

It was possible to examine the patient's mother, who was found to carry the new Hb (40%) with Hb A, and she showed only a very mild microcytosis. The father had died young, as had two brothers, and two sisters were not available. This was unfortunate, for only a full family study could clarify the genetic situation, which involved the three haemoglobins A, H and Q, with the possibility that the thalassaemia was also a factor. The authors discuss the various possibilities, including the chance that the propositus might suffer from "haemoglobin H-thalassaemia associated with haemoglobin Q rather than with haemoglobin A as in the cases hitherto described", and conclude "Nevertheless on the basis of the available evidence we prefer to call the condition haemoglobin Q-H disease". *Alan B. Raper*

Vella, F. **Haemoglobin K in Singapore.** *Brit. Med. J.* 1958, Mar. 29, 755.

The author, from Singapore, records the finding of haemoglobin K in an Indian patient. Family studies showed that the abnormal haemoglobin was transmitted by the mother to the propositus and to his brother. The father, who was of Indonesian-Malay origin, carried normal haemoglobin only. The mother was of north Indian origin, but the exact geographical origin was unknown. No abnormalities which could be

attributed to this abnormal haemoglobin were found in any member of her family.

A second case of haemoglobin K trait was found in a woman of pure Malay origin attending a clinic in Singapore. She had a hypochromic anaemia attributed to exogenous causes. No family study has been possible so far.

In a footnote, the author adds another case, seen in a Malay from Penang: this brings the incidence to 2 of 2,400 Malays studied.

H. J. O'D. Burke-Gaffney

White, P. L., Quiroz, A., Gonzales-Mugaburu, L., Morales, S., Atkins, J., Collazos, C. & Hegsted, D. M. **Effects of Iron Treatment of Anemia in a Tropical Area.** *Amer. J. Clin. Nutrition.* 1957, Nov.–Dec., v. 5, No. 6, 621–8, 4 figs. [20 refs.]

A study is here reported the object of which was to determine the minimum amounts of iron effective in controlling anaemia among schoolchildren in an area of the Peruvian rain forest in which intestinal parasites and particularly hookworms were common. Dietary surveys in the area had indicated a mean iron intake of 12 mgm. per day but in spite of this anaemia was widespread.

To a group of 50 school girls 50 mgm. ferrous sulphate was administered daily for 14 weeks and a placebo was given to a similar group of controls. Haemoglobin values in the experimental group improved from a mean of 9·39 gm. per 100 ml. to 10·21 gm. per 100 ml. in 6 weeks and the value remained virtually unchanged after 14 weeks of treatment. As is to be expected, haematological improvement was greatest in those who initially had the lower haemoglobin values. In the control group no statistically significant change in haemoglobin occurred but there was a tendency for the most anaemic children in this group also to improve during the period of observation. Among those who had received treatment with iron, the improved haematological state continued virtually unchanged for approximately 14 weeks, but 8 months after cessation of treatment the haemoglobin values had returned to their initial levels and had fallen most in those who before treatment were most severely anaemic—a result which might be expected if the degree of anaemia had been related to the hookworm load. No anthelmintic treatment was given during the period of observation.

A further study of two similar groups of schoolgirls showed that daily supplements of 15 mgm. and of 30 mgm. ferrous sulphate were as effective in improving the haematological picture as was the supplement of 50 mgm. and from this it was concluded that a daily iron intake of approximately 25 mgm. was required by these hookworm-infected children. This amount is considered to be not far above that which could be obtained from food enrichment and dietary guidance.

A. W. Woodruff

VENOMS AND ANTIVENENES

Shulov, A., Weissmann, A. & Ginsburg, H. [**Toxicity of the Venoms of Two Sand Vipers of Israel** (*Pseudocerastes fieldii* **Schmidt and** *Aspis cerastes* **L.**)] *Harefuah.* Jerusalem. 1958, Mar. 16, v. 54, No. 6 [in Hebrew 140–43, 2 charts & 1 fig. English summary 143].

The English summary appended to the paper is as follows:—

"Investigations were carried out on two sand vipers of the desert regions of Israel, Pseudocerastes fieldii Schmidt and Aspis cerastes L. Nothing is known about the Pseudocerastes venom and there is no information about the strength of the venom of Aspis cerastes in Israel. Venoms which had been extracted from 4 snakes of the first species and 2 of the second were used. The venoms were extracted by massaging the poison glands and were immediately frozen and later lyophilised (freeze-drying). The strength of each venom was estimated by the LD_{50} method on some 126 white mice of 14–16 gm. weight. The results were LD_{50} = 17·8 γ ± 55 for Pseudocerastes fieldii and LD_{50} = 58·9 γ for Aspis cerastes. The variability was b = 4·72±44% in the first case and b = 6·255±41% in the second.

"Comparison of the strength of the lyophilised venoms of these species with that of other viperid snakes investigated so far in Israel gave the following results:

"Pseudocerastes fieldii is mainly neurotoxic without any significant haemotoxic or local inflammatory effect. However, the venom of Aspis cerastes produced marked local reaction and considerable haemotoxic effects."

Henriques, Olga B., Lavras, Alba A. C., Fichman, Mina, Mandelbaum, Fajga R. & Henriques, S. B. **The Proteolytic Activity of the Venom of** *Bothrops jararaca*. *Biochem. J.* 1958, Apr., v. 68, No. 4, 597–605, 5 figs. [23 refs.]

Bücherl, W. Escorpiões e escorpionismo no Brasil. IV. Considerações em torno de substâncias escorpionicidas e outras medidas de combate aos escorpiões. [**Scorpions and their Effects in Brazil. IV. Observations on Insecticides Lethal to Scorpions and Other Methods of Control**] *Mem. Inst. Butantan.* 1955–56, v. 27, 107–20. English summary.

"Experimental studies on the effect of insecticides on the 2 most common scorpions, in S. Brazil, *Tityus serrulatus* and *T. bahiensis*, are presented in this paper. The following insecticides were investigated: Diethyl-paranitrophenyl-thiophosphate (Rhodiatox), dichlorodiphenyl-trichloroethane (D.D.T.) and benzene hexachloride (Gammexane).

"Rhodiatox, suspended in water and sprayed in a concentration of

0·25 g. per square meter, kills about 70% of scorpions, after direct contact for more than 5 hours.

" D.D.T., suspended in water and sprayed in a concentration of 2 g. of active substance per square meter, kills about 90–95% of scorpions, after direct contact of 5 hours.

" Gammexane, suspended in water, in a concentration of 0·5 g. per square meter, kills practically all scorpions, after a direct contact for 1 hour.

" If no direct contact exists between the chemical and the arthropod or if the three insecticides are exposed to rain, wind, sun or other climatic conditions, these concentrations are no more effective.

" D.D.T. powder with 5% of the active principle, and Gammexane with 1% of the *gamma* isomer per square meter seem to be the *best substances* for killing nearly all scorpions. The following technique for using the insecticides has been found very effective in our experiments: Little boxes (10 to 15 cm. on each side and 1 cm. high, one face open) are constructed with black paper and placed around the internal walls of each room of the house. The insecticide is sprayed on the ground, one gram under each box, and renewed every 4 months. The scorpions walk from room to room during the night, but always [during the day] use the boxes to protect themselves from the daylight and thus come into direct contact with the insecticide spray.

" Our experiments show that 100% of these are killed in this simple and practical way.

" Under these conditions it is suggested that, in such localities afflicted by scorpionism as Belo Horizonte, Ouro Preto, Mariana and Passagem, all in the State of Minas Gerais, Ribeirão Preto, Pontal and Aparecida do Norte in the State of S. Paulo, the problem can be greatly reduced if such boxes are permanently placed in all houses, rooms and gardens and protected from direct rain and daylight."

Adam, K. R. & Weiss, C. **The Occurrence of 5-Hydroxytryptamine in Scorpion Venom.** *J. Exper. Biol.* 1958, Mar., v. 35, No. 1, 39–42, 2 figs. on pl. [12 refs.]

" 5-hydroxytryptamine has been identified as one of the constituents of the venom of *Leiurus quinquestriatus* and its concentration estimated to be 2–4 μg./mg. dry weight of venom. The relevant histochemistry of the venom gland is discussed."

Nicoli, R. M. & Erlande-Brandenburg, G. L'envenimation par piqûre de *Scleroderma* (Hymenoptera, Bethylidae). [**Poisoning by the Sting of** *Scleroderma*] *Ann. Parasit. Humaine et Comparée.* 1957, Oct.–Dec., v. 32, Nos. 5/6, 551–62, 7 figs. & 1 chart. [28 refs.]

Scleroderma is a genus of minute wasps which parasitize various beetle larvae. The wasps have also been known to sting man. The

authors quote some records, since the year 1839, of such attacks and describe 2 recent cases occurring in south-east France.

One of those affected, an adult, showed little effect except a painful itching. The other, a boy aged 7, was stung twice in March 1956. On the first occasion a specimen of *Scleroderma domestica* was captured near his neck; 2 days later he was stung on the scrotum and a wasp was collected from his pyjamas. A third specimen was taken a few days later, in the bedroom after it had been treated with BHC, but no stinging was reported this time. On the second occasion the boy suffered severely and the clinical features of the case are described. The symptoms subsided after a few days and there has been no recurrence. It is insisted, however, that such intense symptoms are unusual.

These wasps are not easy to study because of their small size and their comparative rarity. A table of characters is given to help in the identification of 4 species, *S. abdominalis*, *domestica*, *brevicornis* and *unicolor*, which occur in south-east France. Notes are also given on methods of examination, morphology and biology. [See also this *Bulletin*, 1949, v. 46, 403; 1950, v. 47, 896; 1951, v. 48, 70, and 1954, v. 51, 428.]

H. S. Leeson

TOXOPLASMOSIS

See also p. 825, Biocca, Alcune considerazioni sulla sistematica dei protozoi e sulla utilità di creare una nuova classe di protozoi. [**Systematics of the Protozoa, including a new Class**]

Arean, V. M. Toxoplasmosis en Puerto Rico. [**Toxoplasmosis in Puerto Rico**] *Bol. Asoc. Med. de Puerto Rico.* 1957, Apr., v. 49, No. 4, 127–44, 10 figs. [28 refs.]

Toxoplasma gondii had been earlier found in wild rats of Puerto Rico by Pomales Lebrón, but this is the first report of human cases, 4 of which are described in detail.

(1) A white baby was born dead on the 35th week of gestation, the mother having suffered from "influenza" on the 6th week; there was a moderate degree of hydrocephaly and the brain showed numerous necrotic foci accompanied by lymphocytic and histiocytic infiltrations, and sometimes progressing to calcification, while free *Toxoplasma* and pseudocysts were found both in the brain and in the retina.

(2) A Negro child, 3 months old, was admitted to hospital with pustules on the skin, a respiratory affection, enlarged lymphatic glands, and fever,

and died within a day; the heart, lungs, spleen and liver showed focal areas of necrosis with or without calcification; while the brain showed much the same picture, but here *Toxoplasma* were also found.

Acquired toxoplasmosis was represented by the following cases.

(3) A white man aged 30 years, with 7 years' history of ocular disturbances, was found to have the characteristic choroidoretinitis and a positive dye test at 1 in 1,024; 4 similar cases were also seen giving lower titres to this test.

(4) A white girl, 16 years old, died of carcinoma of the oesophagus; a pseudocyst of *Toxoplasma* was found in the heart muscle.

The paper contains also a useful summary of the clinical types, diagnosis, treatment, and prognosis of toxoplasmosis.

P. C. C. Garnham

Thalhammer, O. Die Toxoplasmose bei Mensch und Tier. [**Toxoplasmosis in Man and Animals**]

This book was reviewed on p. 611.

Gibson, C. L. & Eyles, D. E. *Toxoplasma* **Infections in Animals associated with a Case of Human Congenital Toxoplasmosis.** *Amer. J. Trop. Med. & Hyg.* 1957, Nov., v. 6, No. 6, 990–1000, 1 fig. [19 refs.]

A brief description is given of fatal, congenital toxoplasmosis in a newborn Negro infant in Memphis, Tennessee, U.S.A. The bulk of the paper, however, is devoted to the results of a most interesting epidemiological study in the immediate locality.

Animals were obtained within a radius of approximately 300 feet of the patient's home, except that dogs were collected within a half-mile radius. Brain suspensions from these animals were then inoculated into laboratory mice.

Toxoplasma was isolated from 7 of 35 cats; 2 of 3 domestic ducks; 3 of 7 chickens; 1 of 16 pigeons; and from 7 of 121 house-mice. Of 20 mice caught in the infected family's home, 5 were infected with *Toxoplasma*, while only 2 of 101 mice from neighbouring homes were infected. One dog collected " four blocks away " contained parasites, but 8 others taken within a half-mile radius of the patient's home were negative. No infections were found in 22 wild sparrows and cardinals, and *Toxoplasma* could not be isolated from any mites, lice or fleas removed from many of the animals examined.

Examination of sera from the mother of the child and the 2 siblings (aged 1½ and 3 years) showed high dye-test titres for *Toxoplasma* and significant complement-fixation test titres; the father had negative serological tests.

It is concluded that the results of the serological tests indicate exposure of the family to a common source of infection at a fairly recent time. It is also pointed out that an uncovered garbage barrel was located about 30 feet from the house and served as a feeding spot for many of the animals listed above. From the results of the parasitological studies on these animals it is suggested that " toxoplasmosis should be regarded as a zoonosis in which man is only one of several normal vertebrate hosts ".

R. Lainson

Jones, Frances E., Eyles, D. E. & Gibson, C. L. **The Prevalence of Toxoplasmosis in the Domestic Cat.** *Amer. J. Trop. Med. & Hyg.* 1957, Sept., v. 6, No. 5, 820–26, 1 fig. [16 refs.]

Cats from Memphis, Tennessee, and Columbia, South Carolina, U.S.A., were bled for the Sabin Feldman dye test and were then killed in order to obtain specimens of brain tissue for intraperitoneal inoculation into mice. Up to three serial passages in mice were made and material was examined 2 to 4 weeks after inoculation. 34 infections were demonstrated parasitologically in 140 cats from Memphis (24%), while 90 of these cats gave a positive dye test (64%) with titres chiefly between 1 in 16 and 1 in 64 but in one instance 1 in 1,024. 4 infections were found in 35 cats from Columbia (11%), while 10 of these cats gave a positive dye test (29%). In 5 pregnant cats (2 of which showed parasites) the foetuses were tested by mice inoculation of brain tissue with negative results. The serological and parasitological findings showed a close correlation both in regard to incidence and to the relationship between titre level and recovery of the parasite.

Some mice died of toxoplasmosis during the first passage, but as a rule the strain of parasite was mild and normal virulence was attained only after repeated passage.

No significant illness was apparent in any of these cats, but the high infection rates suggest that this animal may be even more important than the dog in the transmission of the disease to man. *P. C. C. Garnham*

Wildführ, G. Toxoplasmose als medizinisches Problem. [**Toxoplasmosis as a Medical Problem**] *Ztschr. f.d.g. Hyg. u. ihre Grenzgebiete.* Berlin. 1957, Nov.–Dec., v. 3, No. 6, 417–25.

This is a general review of the subject of toxoplasmosis as stated in a lecture in Moscow. The history, clinical findings, diagnosis and treatment are all briefly considered, as is the route of infection; in particular, the difficulties of the diagnosis of toxoplasmosis in relation to the serological findings are discussed. *I. A. B. Cathie*

Bimmer, Edith, Palm, Gerda & Westphal, A. Die Bedeutung des pH-Wertes des toxoplasmahaltigen Peritonealexsudats der Maus für die Titerhöhe im *Toxoplasma*-Serofarbtest. [**The Importance of the *p*H of the Mouse Peritoneal Exudate Containing Toxoplasms in Relation to the Titre of the Dye Test**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1958, v. 9, No. 1, 6–16.

Bozděch, V. & Jíra, J. Hemaglutinační reakce s toxoplasmovým antigenem. [**Haemagglutination Reaction with *Toxoplasma* Antigen**] *Časopis Lékařů Českých.* Prague. 1958, Mar. 21, v. 97, No. 12, 375–6.

The English summary appended to the paper is as follows:—

"An attempt has been made to use the toxoplasma-antigen in a haemagglutination reaction. The frequency of positive reactions in the examined population was lower than the complement-fixation test."

Montgomery, R. D., Donnison, Barbara & Jolly, H. **Congenital Toxoplasmosis.** *J. Clin. Path.* 1958, Mar., v. 11, No. 2, 114–18, 2 figs. [28 refs.]

The authors' first case is of a boy born at 35 weeks' maturity who died at 22 days of age. He had hydrocephalus, microphthalmus and convulsions, but choroidoretinitis was not looked for and cerebral calcification was absent. The cerebrospinal fluid was xanthochromic. Toxoplasms, both free forms and intracellular proliferative forms, were found in the brain. A good description, illustrated by 2 photomicrographs, is given of the pathological changes in the brain. Apart from the absence of calcareous material, these were typical. The mother's serum gave a dye-test titre of 1 in 64 and a complement-fixation titre of 1 in 16.

The second case is regarded by the authors as possible but not proved. It concerns a spastic, microcephalic and microphthalmic boy who died at 9 months of age. Necropsy findings were of septicaemia with left-sided pyonephrosis. The brain showed atrophy and an excess of yellow, gelatinous cerebrospinal fluid. No enlargement of the ventricles and no toxoplasms were found. Nor did the baby's serum at 9 months give a positive reaction in the dye or complement-fixation tests. The mother's serum, however, was positive in the dye test to a titre of 1 in 256 and in the complement-fixation test to a titre of 1 in 64. Six weeks later the titres had fallen to 1 in 80 and 1 in 4. It would appear that she had a recent infection but it might have been after the birth of the baby.

C. P. Beattie

Beverley, J. K. A., Caley, J. P. & Warrack, A. J. N. **Lymphadenopathy in Toxoplasmosis.** *J. Clin. Path.* 1958, Mar., v. 11, No. 2, 119–21, 2 figs. [12 refs.]

There are several interesting features in this case report concerning a woman of 26 years. The initial symptoms, occipital headache and low back pain, are unusual and, indeed, suggested non-paralytic poliomyelitis or benign lymphocytic meningitis. These subsided after a few days and it was not till the patient had returned home from hospital that glands in her right groin, right axilla and neck enlarged. At the same time her backache and headache recurred. She was readmitted to hospital when, apart from widespread lymphadenopathy, the only physical signs were marked tenderness over the lumbar spine and left sacro-iliac joint. Headache persisted. A biopsy specimen of lymph gland showed the histological picture described by Robb-Smith as lympho-histiocytic medullary reticulosis. On account of the lymphadenopathy toxoplasmosis was suspected. Fortunately specimens of serum taken at the onset of her illness were available. These were examined as well as subsequent specimens and showed rising titres of *Toxoplasma* antibodies, as follows:—

Date	*Dye Test*	*Complement-Fixation Test*
17. 8.56	1:77	Negative
23. 8.56	1:102	,,
19.11.56	1:4,600	1:20
12.12.56	1:12,000	1:20

No toxoplasms were found in the excised glands but the rise in antibodies to high titres justified the diagnosis of toxoplasmosis. Photographs and a description of the histological appearances of the glands are given.

[6 specimens of sera have recently been sent to the abstracter's laboratory for serological tests for toxoplasmosis because a histological diagnosis of lympho-histiocytic medullary reticulosis had previously been made; 2 proved strongly positive, 1 was suggestive, while the remaining 3 gave very low titres.] *C. P. Beattie*

Hogan, M. J. **Ocular Toxoplasmosis.** pp. x + 86, 28 figs. [143 r 1951. New York: Columbia University Press [for Amer. Ophth Soc.].

Wildführ, G., Naumann, G. & Wilde, J. Elektrophoretische Untersuchungen von Rattenseren nach latenter Infektion mit *Toxoplasma gondii.* [**Electrophoretic Studies of the Sera of Rats Latently infected with** *Toxoplasma gondii*] *Ztschr. f. Immunitätsf. u. Exper. Therap.* 1958, Feb., v. 115, No. 2, 122–34. [19 refs.]

The serum of 105 rats latently infected with toxoplasms was examined electrophoretically. The total protein increased during the first 3 or 4

weeks and thereafter decreased. At 8 weeks the albumin fraction was somewhat lower and the gamma globulin had increased proportionally. It is concluded that the rat may undergo a process of pure immunization.

I. A. B. Cathie

DERMATOLOGY AND FUNGUS DISEASES

Ridley, M. F. **The Natural Habitat of** *Cladosporium carrionii*, **a Cause of Chromoblastomycosis in Man.** Reprinted from *Australian J. Dermat.* 1957, June, v. 4, No. 1, 23–7, 9 figs. on 3 pls. [11 refs.]

Circumstantial evidence points to timber material as a possible source of infection by *Phialophora verrucosa*, one of the causes of chromoblastomycosis (Conant, *Mycologia*, 1937, v. 5, 597). The discovery of an extensive area of endemic chromoblastomycosis in Queensland [Powell, this *Bulletin*, 1953, v. 50, 444; Barrack, *ibid.*, 445] presented an opportunity to study the endemiology of the disease, the chief local cause of which is *Cladosporium carrionii*. In the search for a natural habitat of this fungus 387 specimens consisting respectively of soil, leaves, bark, grasses, maize, sorghum, lucerne, weeds, animal droppings, sawdust and feathers, and also chips from fence posts and from old logs and firewood, were collected from 3 adjacent dairy farms, a school and an old sawmill, at Abercorn, about 300 miles north-west of Brisbane, where cases of chromoblastomycosis had recently been recognized.

In all, 109 strains of *Cladosporium* spp. were isolated from 64 of the specimens. When these strains were sown on plates of Littman's ox-gall, gentian violet agar and incubated at 32°C., 14 grew well and in general characters were comparable to a stock, authentic strain of *C. carrionii*. However, studies of the macroscopic and microscopic morphology, including spore measurements, in slide cultures on corn meal agar and on glucose peptone agar, showed that only 2 of the strains were morphologically identical with *C. carrionii*. These strains, designated F_1 and F_2, had been isolated from chips of fence posts close to a farm homestead. The rough surface of the posts presented a considerable risk of wounding by splinters.

Reciprocal serological tests conducted according to the technique used by Conant and Martin [*Bull. Hyg.*, 1938, v. 13, 81], with antigens of *C. carrionii*, *Phialophora pedrosoi* and the new strains F_1 and F_2, and the 4 corresponding hyperimmune sera, showed that F_1 and F_2 were antigenically close to or identical with *C. carrionii*, and these 3 were distinct from *P. pedrosoi*, with which, however, they had a group connexion. Cutaneous inoculation experiments on 3 volunteers, with month-old cultures of F_1, F_2 and *C. carrionii*, resulted in small lesions, histologically of the chromoblastomycosis type, containing the characteristic, fumagoid parasitic form of the fungus. *J. T. Duncan*

IWATA, K. & WADA, T. **Mycological Studies on the Strains isolated from a Case of Chromoblastomycosis with a Metastasis in Central Nervous System.** *Japanese J. Microbiol.* 1957, Oct., v. 1, No. 4, 355–60, 4 figs. [11 refs.]

"The two strains isolated from the skin and brain lesions of a nine year old girl who died of chromoblastomycosis were both identified as *Hormodendrum pedrosoi*, and were identical with each other in their morphological properties and pathogenicity in experimental animals. Thus, it was confirmed that this was a rare case of the deep-seated type of chromoblastomycosis caused by *Hormodendrum pedrosoi*."

TROPICAL OPHTHALMOLOGY

PRATT-JOHNSON, J. A. & WESSELS, J. H. W. **Investigation into the Control of Trachoma in Sekhukuniland.** *South African Med. J.* 1958, Feb. 22, v. 32, No. 8, 212–15, 3 figs.

A survey of cases of trachoma in Sekhukuniland, Transvaal, is discussed and it is shown that this disease occurs in 100% of the population of the "Flats".

Sulphonamides given parenterally and antibiotic ointment used locally arrest active trachoma and rapidly clear all evidence of the commonly associated secondary infection. However, relapses are frequent and the authors wonder if a strain resistant to this therapy has been developed.

They were unable to ascertain whether any infection by flies includes the trachoma virus or whether it is confined to the Koch-Weeks bacillus.

It is found that the disease does not occur in the permanent inhabitants of the plateau on the neighbouring Lulu mountains. The explanation of these facts may be found in the lack of water and the prevalence of flies on the Flats. Where the mountain dwellers live, on the other hand, there is no lack of natural sources of water and only a few flies are found. The fly is indicated as the carrier of the virus and the lack of water for washing as an important secondary cause. *D. P. Choyce*

TAYLOR, C. E., GULATI, P. V. & HARINARAIN, J. **Eye Infections in a Punjab Village.** *Amer. J. Trop. Med. & Hyg.* 1958, Jan., v. 7, No. 1, 42–50, 6 figs. [16 refs.]

More than 90% of schoolchildren in a Punjab village had eye infections. By eye infections the authors mean trachoma in its various forms. A control programme with antibiotics applied once daily provided good temporary relief of symptoms and some cures, but infections rapidly returned when treatment was stopped.

Eye infections in the total population were then studied. An overall prevalence rate of 73% was found. Almost half the children under one year of age were infected, rates rose to about 90% during childhood and dropped to 60–70% in adults. Women during the child-rearing age showed significantly higher infection rates than men. The relation to socio-economic conditions is clearly shown by studies of caste groups, and there were important environmental features influencing spread of eye infections.

Control methods in Punjab villages should probably be focused on the homes, where most of the spread of eye disease appears to occur. In addition to mass treatment, education to improve health habits is needed and would be aided by the provision of better facilities for keeping clean.

D. P. Choyce

Babbar, O. P. & Shukla, K. N. **Serology of Trachoma: Part II—Complement Fixing Antibodies in Early, Active and Healing Cases of Trachoma.** *J. Sci. & Indust. Res.* New Delhi. 1957, Apr., v. 16C, No. 4, 80–82. / [15 refs.]

"Sera of trachoma patients with early, active and healing types of lesions have been examined for the presence of complement-fixing antibodies. All the sera possessed a low concentration of antibodies, and a significant increase in the variation of antibodies was found in patients with healing lesions. A few isolated inclusion bodies were also observed in some of the patients. The absence of inclusion bodies in a majority of the patients may be due to the presence of antibodies in the sera."

MISCELLANEOUS DISEASES

Higgin, Davida W. **A Comparison of 17-Ketosteroid Fractionation in West Africans and Europeans.** *J. Trop. Med. & Hyg.* 1958, Mar., v. 61, No. 3, 62–6, 3 figs. [19 refs.]

"1. The significant difference in total 24-hourly 17-ketosteroid output between West Africans and Europeans was confirmed for a randomly selected subsample of purified ketonic extracts.

"2. Comparison of 30 adsorption chromatograms of both males and females of the two groups failed to show any disproportionate lowering of particular fractions among the African subjects.

"3. Attention is drawn to a number of normal and pathological conditions among Europeans wherein a low total 17-ketosteroid excretion is not accompanied by a change in fractionation pattern.

"4. The origin of the low total output in Africans, as in the European conditions mentioned, is at present unknown."

Charmot, G., Bascoulergue, P., Bergot, J. & Reynaud, R. A propos d'un cas de macroglobulinémie. Considérations sur la dysglobulinémie chez l'Africain. [**Observations on Dysglobulinaemia in Africans, occasioned by a Case of Macroglobulinaemia**] *Bull. Soc. Path. Exot.* 1957, Sept.–Oct., v. 50, No. 5, 838–43. [17 refs.]

The authors discovered, by the distilled water precipitation test for serum macroglobulins, a typical case of "macroglobulinaemia" in a 25-year-old African from the Middle Congo, French Equatorial Africa. Though the clinical and biochemical findings agreed well with those originally described by Waldenström, it was of course not possible to arrive at the final and conclusive proof of the diagnosis, which requires examination of the serum in an ultracentrifuge. The authors speculate whether the high serum gamma globulin seen so frequently in Africans may not be the cause, or be associated with the cause, of common cirrhosis in most instances, but may on occasion cause macroglobulinaemia as seen in this patient. *H. Lehmann*

Steiner, P. E. & Davies, J. N. P. **Cirrhosis and Primary Liver Carcinoma in Uganda Africans.** *Brit. J. Cancer.* 1957, Dec., v. 11, No. 4, 523–34, 10 figs. on 2 pls. [13 refs.]

Cancer of the liver ranks fourth in frequency among malignant diseases in Uganda, its incidence is chiefly in young males, and it usually arises on a basis of hepatic cirrhosis. To investigate its high incidence in the relatively young it was necessary to enquire why its precursor, cirrhosis, was so common, whether the latter was of any unusual type, and why it so quickly led on to cancerous change. 100 cases of cirrhosis from Uganda were studied (in 50 of them cancer was already present), and compared with 400 cases of cirrhosis from Chicago.

The Uganda livers were generally small, their nodularity was of the coarse type but the largest nodules did not exceed 15 mm. in diameter; scar tissue was often recorded as accounting for about half the area of the cut surface. It was often difficult to decide whether the appearance was that of post-necrotic scarring or of diffuse fibrosis, and this difficulty was not always resolved by microscopic examination. However, 38 of the 100 livers were classified as post-necrotic, and 59 as various forms of Laennec's cirrhosis; only 3 were of other types. Consideration of the histopathology led to the conclusion that post-necrotic and Laennec types had many morphological features in common, that the total picture was in fact remarkably uniform, and that it would be reasonable to postulate one main actiology for this cirrhosis. By contrast, the American series showed greater variety of histological pattern and size, and large fatty livers were not unusual. Other features prominent in the African series were more active proliferation of fibrous tissue, less liver cell regeneration, smaller regenerative nodules, and the frequent presence of an inflammatory exudate.

African cirrhosis was found at ages from 12 to 65 years (average 35), it had no special tribal incidence, and was not significantly more common in males than in females. Having regard to its histopathology, and to the wide distribution of viral hepatitis, the authors lean to the view that its main excitant is infectious hepatitis, aided by a marginal state of nutrition.

In the 70 African cases of liver cancer studied, the age distribution was very similar to that of the cirrhosis series (range 12 to 70, average 36 years), but quite different from that of the Chicago cancer series (average 58·3 years). Only one was a cholangioma, the rest hepatocellular cancers. Except for this high proportion of hepatocellular growths, the African and American series resembled each other. 15 (21%) of the African cancers arose in non-cirrhotic livers, a finding not notably different from the American experience. It proved impossible to identify any abnormal cells that could be called pre-cancerous, either in cirrhotic or non-cirrhotic cancer-bearing livers. Regenerative nodules appeared to be an unlikely direct source of cancer, as they were less active in African than in American livers. It is suggested that cirrhosis may not be a direct precursor of cancer, but merely an indicator of severe liver damage (which presumably gives rise in due course to either lesion, or both).

Alan B. Raper

Renner, U., Jöhl, A. & Stoll, W. G. Zur Struktur von Hypoglycin A. [**The Structure of Hypoglycin A**] *Helvetica Chimica Acta.* Basle. 1958, Mar. 15, v. 41, No. 2, 588–92. [Refs. in footnotes.]

[See this *Bulletin*, 1956, v. 53, 370.]

Burch, G. E. & Hale, A. R. **A Plethysmographic Study of the Toe of a Patient with Ainhum.** *Arch. Intern. Med.* 1957, July, v. 100, No. 1, 113–25, 8 figs. [22 refs.]

"A typical case of ainhum in an American Negro has been described. Plethysmographic studies of the digital circulation in the involved toe revealed adequate blood supply. Detailed serial histologic sections of the amputated toe failed to show a constricting circumferential band of connective tissue but did reveal chronic inflammation of the digital arteries, periosteum, skin, and soft tissues, with much atrophy of the distal phalanx. A brief review of ainhum has been presented, with a discussion of the possible etiologic mechanism of the entity."

PARASITOLOGY: GENERAL

HARPER, Kathleen, LITTLE, M. D. & DAMON, S. R. **Advantages of the PVA-Fixative Two-Bottle Stool Collection Technic in the Detection and Identification of Intestinal Parasites.** *Pub. Health Lab.* 1957, July, v. 15, No. 4, 96–108.

859 paired specimens of faeces were collected in an unpreserved state, and fixed in PVA [polyvinyl alcohol], from patients in Indiana, U.S.A. The PVA fixative was prepared by mixing 935 cc. Schaudinn's solution with 50 cc. acetic acid, 15 cc. glycerol and 50 gm. of Elvanol (71–24 grade), heating to 75°C. to dissolve the Elvanol and dispensing in rubber screw-capped bottles. The unpreserved specimens were examined in direct wet mounts (plus iodine) and by the zinc sulphate concentration method; the PVA specimens were smeared on a slide, dried overnight (at 37°C.) and stained with phosphotungstic or Heidenhain's haematoxylin. Protozoa were detected 349 times after PVA treatment, 243 times after concentration and 209 times after direct wet mounting; the relative efficiency of the methods were 80%, 56% and 48%, respectively. Combination of PVA treatment and concentration of unpreserved material increased this figure to 97% and demonstrated the usefulness of providing 2 bottle outfits (one with and one without fixative) for collection of specimens.

60 specimens were obtained from hospital patients, half of whom had been purged and half not; the cathartic stools showed *Entamoeba histolytica* 15 times; the non-cathartic only 3 times. Helminth eggs can also be detected after PVA treatment. *P. C. C. Garnham*

JAYEWARDENE, L. G. **The Merthiolate Iodine Formaldehyde Concentration Technique for the Detection of Parasitic Material in Faecal Samples.** *Parasitology.* 1957, Dec., v. 47, Nos. 3/4, 405–12. [10 refs.]

Three methods were compared for their efficiency in detecting helminth ova and protozoa in faecal specimens: direct saline smear, Willis salt flotation concentration, and Merthiolate iodine formaldehyde concentration [see this *Bulletin*, 1955, v. 52, 700]. A total of 543 specimens were obtained from schoolchildren and adults from Colombo and from distant parts of Ceylon; many samples were quite old before being examined. The MIFC technique showed a much greater efficiency than the other methods for the detection of helminths, giving up to 10 times the number of positives for hookworm, roundworm, whipworm and threadworm ova (tapeworm was apparently absent); but this method was not as good as the direct smear for most protozoa (except *Entamoeba coli* cysts) and in fact almost failed to demonstrate the smaller cysts or trophozoites. The salt concentration method was useless for protozoa, and the author proposes to adopt as a routine the other two methods. *P. C. C. Garnham*

Silva, M., Jr. Novo método de exame parasitológico das fezes: o "Detector Larvoocyst". [**New Method for the Parasitological Examinations of Faeces: the "Detector Larvocyst"**] *Rev. Brasileira Med.* Rio de Janeiro. 1957, Aug., v. 14, No. 8, 545–50, 16 figs. English summary (9 lines).

The author describes a modification of Faust's concentration method (with 33% zinc sulphate) for the detection of ova and cysts in the stool. The description of the process is illustrated by large drawings which would enable anyone to carry out the method with the greatest of ease. After a preliminary concentration with 33% zinc sulphate, the residue is subjected to further treatment with 35% zinc sulphate in a "larvocyst detector"—a double glass tube in which the parasites rise to the meniscus and are pipetted off for examination. The author stresses the fact that the examination of a minute portion of the daily output of faeces (normally about 150 gm. in an adult) may be most inadequate and shows how this new method can cope with the total stool by emulsification in 10 times the quantity of water and homogenization in an electrical liquefier. It is stated that the technique occupies only 10 minutes and gives results superior to any other. *P. C. C. Garnham*

Rossi-Espagnet, A. & Capone, M. Considerazioni sulla frequenza delle parassitosi intestinali in base all'esame coprologico di 6,000 individui osservati presso la Clinica Medica di Roma dal 1947 al 1956. [**The Frequency of Intestinal Parasites. Results of 6,000 Faecal Examinations at a Clinic in Rome**] *Riv. di Parassit.* Rome. 1958, Jan., v. 19, No. 1, 47–58, 2 graphs. English summary.

The authors present a report of the examination of 6,057 specimens of faeces from the same number of persons performed at the Medical Clinic of the University of Rome from 1947 to 1956. Persons of each sex and aged from 10 to 80 were examined; in a number of instances, in addition to simple macro- and microscopical tests, enrichment procedures were also carried out. The results are set out in a series of tables and diagrams which give details of the various protozoa and helminths found, the ages of the examinees and the annual and monthly incidence.

In all, 7 different protozoa and 7 different helminths were detected and females were more often infected than males. *Giardia* was by far the most common protozoon. Among helminths, as might be expected, *Ascaris* was the most frequent, 3·3% of all males and 6·5% of all females being positive. Like *Giardia* it was most common in the 10–19 age-group. Ankylostomes were found in 0·9% of males and 1·5% of females, the 10–19 age-group being again the most affected, with the 20–29 group next. *E. histolytica* was found in 1·1% of males and 0·7% females, but its incidence is decreasing as it was high in 1947 and fell to almost negligible proportions by 1956. The most affected age-group by far was

30–39. The only 2 cestodes found were *T. saginata* and *H. nana*, which together affected only 0·7% of all the persons examined, with a slightly greater proportion of males. 170 of the subjects harboured more than one parasite.

The authors point out that their methods were not the best for demonstrating *Enterobius* as the Graham scotch-tape method is better, and that, in addition, in contrast with almost all the other infections, this parasite occurred also in the better-off social classes, being often of a "family" nature. They also state that their figures do not give a proper indication of the true incidence and extent of ankylostomiasis in the region (Latium), which would be better ascertained by a special investigation. A number of the ankylostomiasis foci arose in people coming in from other regions, especially Calabria, where the incidence is high. In assessing the incidence of intestinal parasites for the region they admit that their statistics are overweighted by those for Rome itself, as out of the 5,219 people residing in Latium, 3,982 were inhabitants of the city.

W. K. Dunscombe

DE MORAIS, A. T. Subsídios para o estudo das parasitoses intestinais humanas no Distrito da Zambézia. [**Survey of Human Intestinal Parasites in Zambézia, Portuguese East Africa**] *Anais Inst. Med. Trop.* Lisbon. 1957, Mar.–June, v. 14, Nos. 1/2, 137–43.

The English summary appended to the paper is as follows:—

"By data collected on a survey done in the Zambézia District among 1800 natives of both sexes between the ages of 3 to 20 years, most of the common human parasites were found.

"The mean average rate of global infection for the parasites found is 85·77%.

"Of the species considered most pathogenic to man the following rates of infection were found: Ancylostomidae—53·61%; Strongyloides stercoralis—10·88%; E. histolytica—1·22%; Lamblia intestinalis—0·72%.

"No noted variations were found regarding the sex and age group of the examined individuals."

DE MORAIS, T. Aspectos das associações de parasitas intestinais mais frequentes no Distrito da Zambézia. [**Frequency of Multiple Infections with Intestinal Parasites in Zambézia, Portuguese East Africa**] *Anais Inst. Med. Trop.* Lisbon. 1957, Mar.–June, v. 14, Nos. 1/2, 155–8.

The English summary appended to the paper is as follows:—

"On a general survey done among the natives of the Zambézia District in Portuguese East Africa it was found that of 1,800 natives examined 52·5% presented intestinal parasitic associations varying from two to six parasites. The most frequent association consisted of *Ascaris* and *E. coli*

and the most frequent pathogenic association was that of Ancylostomidae and *Ascaris*."

Pessôa, S. B. Parasitoses intestinais nos dois primeiros anos de vida. [**Intestinal Parasites in the First Two Years of Life**] *Brasil-Médico*. 1957, Nov. 2–30, v. 71, Nos. 44/48, 351–8.

The following is a translation of the author's summary:—

The author gives results of a brief statistical study of intestinal parasites in the first two years of life carried out in the States of Paraíba and Alagôas. General helminthic parasitism was of the order of 66·8% up to 1 year of age and of 92·1% between 1 and 2 years. *Ascaris lumbricoides* infection was found in infants of 47 and 75 days. Ankylostomiasis also was well disseminated in children between 1 and 2 years; schistosomiasis was less common. The degree of parasitism was light or average. The author found no heavy infections, as the maximum number of eggs per gm. of faeces was 96,000 for *Ascaris*, 8,000 for *Necator* and 4,800 for *Trichuris*. He believes that infection from the first days could result from air-borne *Ascaris*, because he found great numbers of these eggs in dust. He similarly suggests that infection by *Entamoeba coli* follows this course as, although infants up to 1 year are rarely infected with *Entamoeba histolytica*, the cysts of which die instantaneously from desiccation, 60% are infected with *E. coli* whose cysts resist desiccation.

The author draws the attention of the authorities to the necessity for paediatric specialists in health clinics who would be responsible for therapy and prophylaxis of intestinal parasitic diseases in children, particularly in their first years. *A. H. Phipps*

Biocca, E. Alcune considerazioni sulla sistematica dei protozoi e sulla utilità di creare una nuova classe di protozoi. [**Systematics of the Protozoa, including a new Class**] *Rev. Brasileira Malariologia*. Rio de Janeiro. 1956, Jan., v. 8, No. 1, 91–102. [34 refs.] English summary (7 lines).

A critical review is given of various methods of classification of the Protozoa, and especially of those groups of parasitic organisms, the systematic position of which has hitherto remained undetermined, *viz.* the toxoplasms, sarcosporidia and piroplasms, as well as *Besnoitia* and *Globidium*. The author believes that these protists should be united into a new class, Toxoplasmatea, the position of which among the protozoa, according to his classification, is as follows:

Phylum PROTOZOA

Subphylum Homokaryota subph. nov. (with functionally similar nuclei).

Subphylum Heterokaryota (Hickson, 1903) Piekarski, 1954 (with functionally dissimilar nuclei).

The Homokaryota are divided into the following classes: Rhizopodea Siebold, 1845; Mastigophorea Diesing, 1865; Toxoplasmatea cl. nov.; Sporozoea Leuckart, 1879; Cnidosporidiea Doflein, 1901; Ciliatoidea Ulrich, 1950.

The Heterokaryota contain the classes Ciliatea Perty, 1852 and Suctoriea Claparède and Lachman, 1858.

The new class Toxoplasmatea comprises parasitic protozoa lacking organellae of locomotion and multiplying asexually by binary fission, with the following subdivisions:

(1) Order Toxoplasmatida ordo. nov.
Suborder Toxoplasmatina subordo. nov.
Family Toxoplasmatidae, with genus *Toxoplasma*.
Suborder Sarcosporidina (Balbiani, 1882).
Family Sarcosporidae, with genera *Sarcocystis*, *Besnoitia* and *Globidium* (?).

(2) Order Piroplasmida Reichenow, 1953.
Family Babesiidae, with genus *Babesia*.
Family Theileriidae, with genus *Theileria*.

C. A. Hoare

Kòberle, F. Über Sarkosporidiose beim Menschen. [**Sarcosporidiosis in Man**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1958, v. 9, No. 1, 1–6, 4 figs. [13 refs.]

The English summary appended to the paper is as follows:—

"A case of sarcosporidiosis in man is reported.

"In the heart of a negro woman, about 40 years of age, who died in coma caused by diabetes, several thousands of well-preserved *Sarcosporidia* cysts and one myocarditic focus formed around dead parasites were found.

"It is suggested that a severe myocarditis may be due to a simultaneous disintegration of numerous cysts. As its histology will resemble a so-called isolated or giant-cell myocarditis (Fiedler's myocarditis), in etiologically uncertain cases *Sarcosporidia* infections should be considered. To reveal the true nature of myocarditis of uncertain etiology, serial sections should be made and thoroughly studied."

[See this *Bulletin*, 1935, v. 32, 226.]

Eberling, E. W. & Cohen, F. *Pneumocystis carinii* **Pneumonia. Report of a Case from Southwestern United States.** *Pediatrics.* Springfield, Ill. 1958, Mar., v. 21, No. 3, 345–52, 7 figs. [20 refs.]

"A native-born American infant presented clinical and pathologic features characteristic of pneumonia due to Pneumocystis carinii. Apparently at the present writing this is the second such case to be

reported from the United States. Though the clinical picture was distinctive enough to suspect the etiology during life, confirmation awaited pathologic studies. This is the third known case to show a low concentration of gamma globulin as a possible contributory factor. Much remains to be learned about this distressing but apparently quite distinctive pulmonary disease, which may be more common than is now generally appreciated."

[See this *Bulletin*, 1956, v. 53, 1491.]

ENTOMOLOGY AND INSECTICIDES: GENERAL ZOOLOGY

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

Colless, D. H. **An Improved Technique for Permanent Mounts of Small Insects and Nematodes.** *Bull. Entom. Res.* 1958, Mar., v. 49, Pt. 1, 45–7.

"An improved technique is described for the preparation of permanent mounts of small Arthropoda and Nematoda, using a phenol-balsam mounting medium; a method is also described for clearing live, or freshly killed, specimens in strong chloral hydrate solution. The essential feature of the mounting method is the transfer of the specimen to a slide, in a drop of phenol, to which dry, powdered balsam is added and allowed to dissolve *in situ*. The mount is then dried and later covered in the usual fashion."

[See this *Bulletin*, 1951, v. 48, 94.]

Sacktor, B. & Cochran, D. G. **The Respiratory Metabolism of Insect Flight Muscle. I. Manometric Studies of Oxidation and Concomitant Phosphorylation with Sarcosomes.** *Arch. Biochemistry.* 1958, Mar., v. 74, No. 1, 266–76, 2 figs. [21 refs.]

Rioux, J. A. & Ruffié, J. Présence d'*Anopheles maculipennis* s. sp. *subalpinus* Hackett et Lewis 1937 en Bas-Languedoc. Intérêt des méthodes caryosystématique et statistique. [**Presence of** *Anopheles maculipennis* **s.sp.** *subalpinus* **in Lower Languedoc. Systematic and Statistical Observations**] *Bull. Soc. Path. Exot.* 1957, Sept.–Oct., v. 50, No. 5, 831–7, 6 figs.

Chen, P. S. **Studies on the Protein Metabolism of *Culex pipiens* L.—I. Metabolic Changes of Free Amino Acids during Larval and Pupal Development.** *J. Insect Physiol.* London. 1958, Mar., v. 2, No. 1, 38–51, 7 figs. (1 on pl.) [49 refs.]

La Face, Lidia. Sulla diffusione del complesso *pipiens-molestus* nella provincia di Latina e possibile influenza esercitata dagli insetticidi. [**On the Diffusion of the *pipiens-molestus* Complex in the Province of Latina and the Possible Influence exercised by Insecticides**] *Rendiconti Istituto Superiore di Sanità.* Rome. 1957, v. 20, Pt. 12, 1091–108. [10 refs.] English summary.

Culex pipiens molestus, the autogenous form of the *pipiens* complex, is generally believed to prefer urban districts. The author has regularly searched for adult and larval foci in the Latina province and found that *molestus* is very common in rural areas. (She based the *pipiens-molestus* identification on the criterion of whether specimens taken to the laboratory could eventually produce autogenous eggs.) The *molestus* larvae found suitably nitrogenous water for breeding in leachings from manure pits of farms and in drains of the former Pontine marshes. Such sites were sometimes partially covered, but rarely totally enclosed. Nevertheless, adults were often found resting on the walls of such drains or ponds; and in these and other non-domestic shelters (caves, old walls, bridges, vegetation) adults of *molestus* and *pipiens* could both be found. Hybridization would seem very possible and was further indicated by certain females which produced an autogenous progeny followed by an entirely autogenous strain in subsequent generations. [This would agree with the known recessive nature of the gene for autogeny.]

Adults of the *molestus-pipiens* type were very seldom found in houses or animal shelters. The author ascribes this to the very wide use of insecticides in Latina. She considers that the repellent effect of the insecticides is driving out the domestic strains of *Culex*, in the same way as they have acted against domestic anophelines in Sardinia and Sicily. The effect is noticed by inhabitants of Latina who find that they are no longer bitten by culicines indoors though they are still readily attacked outside. *J. R. Busvine*

Macdonald, W. W. **Malaysian Parasites—XVI. An Interim Review of the Non-Anopheline Mosquitoes of Malaya.** *Studies from Inst. Med. Res. Federation of Malaya.* 1957, No. 28, 1–34, 1 map. [Numerous refs.]

There has been no monographic work dealing with culicine mosquitoes of Malaya since a monograph on mosquitoes as a whole by G. F.

Leicester in 1908. Current trends of interest in virus infections and filariasis in Malaya fully justify this presentation of the available information. This work is certainly a basis of reference for future studies on the culicines of Malaya. Mosquitoes of Singapore are not noted unless a species is recorded from there but not yet from Malaya. A later publication by Dr. D. H. Colless is to cover Singapore mosquitoes.

The species list for Malayan culicines amounts now to 215 species and there is likelihood of new species being described later. The main body of the text arranges the species systematically and, for each, provides a brief indication of known local distribution in Malaya (except Singapore) besides elsewhere in the Oriental and Australasian regions. Brief notes are given of adult and larval habits. A map shows the locality of the records for Malaya, and these are also briefly described in the text.

Tables summarize particulars on vectorial status, distribution from the ecological standpoint, breeding places, biting activity and host preferences for about 30 species signified as the principal culicines. Vectors of filariasis shown are *Mansonia uniformis* and two morphologically similar species, *M. bonneae* and *M. dives* (=*M. longipalpis*), with doubtful incrimination of *Culex fatigans* and mosquitoes of the *Aëdes chrysolineatus* group. *Culex gelidus* and *C. tritaeniorhynchus* are given as probable vectors of Japanese B encephalitis, with the *C. vishnui* group, *A. butleri* and *A. amesi* suspect on epidemiological grounds. These last two species, together with the *A. niveus* complex, *A. aegypti* and *A. albopictus* are also, on the same grounds, shown as vectors of dengue and, potentially, of yellow fever.

This paper is the first in the above volume (Study No. 28) which binds together numerous papers, most on trombiculiids. These are noticed elsewhere in this *Bulletin* [1958, v. 55, 530; and August (*in press*)].

D. S. Bertram

Galliard, H. & Golvan, Y. J. Influences de certains facteurs nutritionels et hormonaux, à des températures variables, sur la croissance des larves d'*Aedes* (*S.*) *aegypti*, *Aedes* (*S.*) *albopictus* et *Anopheles* (*M.*) *stephensi*. [**Influence of Certain Nutritional and Hormonal Factors at Different Temperatures on the Growth of Larvae of** *Aëdes aegypti*, *Aëdes albopictus* **and** *Anopheles stephensi*] *Ann. Parasit. Humaine et Comparée*. 1957, Oct.–Dec., v. 32, Nos. 5/6, 563–79, 6 figs. [27 refs.]

The authors have compared the speed of development of mosquito larvae, reared in various breeding media, and kept at different temperatures, and their experimental results are given in detail. Media with a high protein content, such as those made up from milk proteins, or bird feed diets (D.11 and OG.11) produced a more rapid development of the larvae than media made up from powdered dog biscuit. The addition of

thyroxine to dog biscuit infusion also speeded development, but the addition of vitamin B12 to dog biscuit obviously speeded development only in *Aëdes aegypti* and *Anopheles*. One of the bird feed diets used, OG.11, contained antibiotics, but there was no obvious difference in the growth of *Aëdes aegypti* at 21°C. in this medium compared with the other, D.11. [Some of the authors' conclusions do not appear to be justified by their experimental results.]

[See also this *Bulletin*, 1953, v. 50, 654; 1956, v. 53, 1391.]

B. R. Laurence

Bar-Zeev, M. **The Effect of Temperature on the Growth Rate and Survival of the Immature Stages of *Aëdes aegypti* (L.).** *Bull. Entom. Res.* 1958, Mar., v. 49, Pt. 1, 157–63, 2 figs. [10 refs.]

The following is taken from the author's summary:—

"The curve relating temperature and time of development from newly hatched larvae to adult is hyperbolic, except at the extremes. The later the instar, the lower is the temperature at which growth is most rapid. The threshold of development was between 9° and 10°C., the developmental zero 13·3°C., and the average thermal constant (between 16° and 32°C.) 2,741 degree-hours. The highest and lowest temperatures permitting development from newly hatched larva to adult were 36° and 14°C., respectively. The average durations of the four successive larval stages and the pupal stage, expressed as percentages of the time taken for newly hatched larvae to reach the adult stage, were 14·6, 13·9, 17·5, 33·3 and 20·6, respectively."

Ascher, K. R. S. **Investigations on a Fluorocarbon as "O.I.T.C.-Agent" (Oviposition-Inhibiting Tarsal Contact Agent) in Mosquitoes.** *Riv. di Malariologia*. 1957, Dec., v. 36, Nos. 4/6, 209–15, 1 fig. [21 refs.]

After successful results with house-flies, experiments were carried out to investigate whether the "O.I.T.C.-agent" di-(*p*-chlorophenyl)-trifluoromethylcarbinol (I) had a similar oviposition-inhibiting effect on mosquitoes.

Aëdes aegypti females 4–5 days old were exposed under an inverted glass funnel to a deposit of 1 gm./sq. m. I (from an acetone solution) on filter paper for 10–40 minutes. They were then starved for 24 hours and given a blood meal.

When on subsequent days the eggs were collected and counted, it was discovered that the mean number laid had been reduced by up to 50%. Examination of egg distribution histograms showed that with increasing exposure more low and medium range layers became eliminated (*i.e.*

became "non-layers") while "the upper ranges, and the maximum number of eggs laid by a single female (100–110)" remained unchanged.

R. J. Wood

PARKER, A. H. **The Effect of Acetone Concentration and Larval Density on the Mortality of *Aëdes aegypti* Larvae exposed to DDT and Dieldrin.** *Ann. Trop. Med. & Parasit.* 1957, Dec., v. 51, No. 4, 368–73.

Experiments have been carried out to determine the effect on the mortality of *Aëdes aegypti* larvae exposed to DDT or dieldrin of variations in (a) the concentration of acetone and (b) the number of larvae in the insecticidal solutions.

When larvae of all ages were exposed to their median lethal doses of DDT or dieldrin made up with different concentrations of acetone (differences of up to 100-fold), no significant variation in mortality was noted. Exposures were made for one hour with first to third day larvae and for 24 hours in the case of fourth to eighth day larvae.

Well-marked variations were noted when the density of the exposed larvae was changed. An increase above the level of 20 eighth day larvae per 100 cc. exposed for one hour to either DDT or dieldrin caused a reduction in the mortality. A similar effect was produced when fourth day larvae were exposed for 24 hours to DDT, but not when the insecticide used was dieldrin.

A decrease in the number of eighth day larvae below 20 specimens per 100 cc. caused a corresponding increase in mortality, but only when exposures were for 24 hours. An exposure for one hour caused no significant change.

R. J. Wood

COLLESS, D. H. **Records of Two Pacific Island Species of Mosquito from Singapore Harbour.** *Med. J. Malaya.* 1957, Dec., v. 12, No. 2, 464–7, 3 figs.

Adults of *Aëdes hensilli*, which belongs to the *A. scutellaris* group, were reared from larvae taken from a tree hole on the island of Pulau Hantu, inside Keppel Harbour, Singapore, in 1954, and by 1957 this species was found to be breeding commonly on the island, mainly in water collected in fallen palm fronds. The island is heavily wooded and, unlike the mainland, not subject to regular control measures. *Culex litoralis* was also found on Palau Hantu in 1957 and appears to be established there. Both mosquitoes have a known distribution to the east of Singapore, covering the islands of the West Pacific, and, as both species have been found together in a single small area close to the wharves of the harbour, there are strong grounds for suspecting recent introduction by shipping. The author points out that more serious vectors may be introduced in the same way [this *Bulletin*, 1957, v. 54, 506].

B. R. Laurence

Hewlett, P. S. **Interpretation of Dosage-Mortality Data for DDT-Resistant Houseflies.** *Ann. Applied Biol.* 1958, Mar., v. 46, No. 1, 37–46, 2 figs. [23 refs.]

"The slopes of the lines relating probit mortality to the log.-dose of DDT are generally lower for resistant than for susceptible strains of houseflies. Two effects that could each account for this are discussed. The first concerns the relation of the amount of DDT absorbed to the dose; the conditions under which it would occur are stated, and published data on the absorption are analysed. The second concerns the variability from fly to fly of the amount of DDT exerting a toxic effect at the primary site of action, a variability that would seem to be brought about, or greatly intensified, by the enzymatic detoxification of DDT in resistant flies. Both mechanisms may occur, reinforcing one another."

Wheeler, C. M., Newson, H. D. & Blakeslee, T. E. **Insecticide Resistance in Houseflies of Japan, Korea, and the Ryukyu Islands.** *U.S. Armed Forces Med. J.* 1958, Jan., v. 9, No. 1, 68–76.

"The median-effective dose (M_{50}) values for DDT, lindane, dieldrin, and malathion were determined for 13 strains of houseflies from Japan, 6 strains from the Ryukyu Islands, and 1 strain from Korea. All strains, except one from Ishigaki, Ryukyu Islands, and one from Korea, were highly resistant to DDT, and five strains also showed high resistance to lindane and malathion.

"An appreciable increase in resistance to DDT was noted for 11 strains originating in the same areas and tested in both the 1955–1956 and the 1956–1957 series. The same was true of 5 strains tested against lindane, 9 strains against dieldrin and 7 strains against malathion. A slight decrease in M_{50} values was recorded for 4 strains tested against lindane. In two such cases, strains from Yokohama Stable B and Yokohama Stable C, use of lindane spray had been discontinued for about one and one-half years. Low resistance to malathion was encountered in 8 of the 20 strains tested, the remainder being susceptible."

Gahan, J. B., Wilson, H. G., Keller, J. C. & Smith, C. N. **Organic Phosphorus Insecticides as Residual Sprays for the Control of House Flies.** *J. Econom. Entom.* 1957, Dec., v. 50. No. 6, 789–93. [12 refs.]

"Of 30 materials evaluated in the laboratory as residual sprays against house flies (*Musca domestica* L.), the most promising were Dow ET-15, Dow ET-57 (sampled as Dow ET-14), Diazinon, Bayer 21/199 and EPN.

"In Florida barns Diazinon residues at 50 to 200 mg. per square foot gave 90 to 100% control for periods ranging from 3 days to at least

7 weeks. Treatments applied to both the walls and ceilings were superior to those applied only to ceilings. Dow ET-57 remained highly effective for 1 to 28 days and Am. Cyanamid 4124 was satisfactory for 1 to 14 days. These three chemicals were better than malathion, Dipterex, Bayer 21/199, and Chlorthion, which usually lasted no more than 1 week.

"Diazinon and malathion were both slightly more effective under conditions prevailing in Nebraska than in Florida. Diazinon gave satisfactory control for 9 to 35 days at 50 to 100 mg. per square foot, whereas malathion at 100 and 200 mg. was satisfactory for 1 week or less. DDT was poorer than either of these materials."

Serdyukova, G. V. **Key to *Hyalomma* Ticks of Russia (pp. 79–83) from Ixodid Ticks of Russia.** *Det. Fauna SSR (Zool. Inst. Acad. Sci. SSR).* 1956, v. 64, 1–122. [T2.] [Translated from Russian by Dept. Med. Zool., U.S. Naval Med. Res. Unit No. 3, c/o American Embassy, Cairo, Egypt.]

Galuzo. **Key to the Genus *Ornithodoros* (of Russia) (after Pavlovsky, 1955) (pp. 83–5) from Argasid Ticks and their Epizootological Significance.** *Alma-Ata (Acad. Sci. Kazakh SSR).* 1957, 131 pp. [T4.] [Translated from Russian by Dept. of Med. Zool., U.S. Naval Med. Res. Unit No. 3, c/o American Embassy, Cairo, Egypt.]

Fay, R. W. **The Use of Radioactive Compounds in the Study of Insecticide Metabolism.** Reprinted from *43rd Annual Meeting Proc. Chem. Specialties Manufacturers Ass., Inc.* 1956, Dec., 3 pp. [18 refs.]

Winteringham, F. P. W. **Comparative Biochemical Aspects of Insecticidal Action.** Reprinted from *Chemistry & Indust.* 1957, Sept. 7, 1195–1202, 2 figs. [102 refs.]

Vargas, L. Principios de formulación de insecticidas. [**Principles of Insecticide Formulations**] *Bol. Epidemiológico.* Mexico. 1957, Jan.–Feb.–Mar., v. 21, No. 1, 10–30.

[Useful practical directions for preparing and applying insecticides for control of insects of public health importance.]

Smith, C. N. **Insect Repellents.** *Soap.* New York. 1958, Feb. & Mar., v. 34, Nos. 2 & 3, 105–12, 203; 126–33, 18 figs. [18 refs.]

[This article describes, with photographic illustration, practical methods of testing samples of chemicals for repellent action against insects and mites of public health importance. The techniques are those employed at the U.S. Department of Agriculture Research Station at Orlando, Florida.]

Busvine, J. R. **A Critical Review of the Techniques for Testing Insecticides.**

This book was reviewed on p. 608.

MISCELLANEOUS PAPERS

i. Chippaux, C. & Anraedt, J. Le placenta "frais" en chirurgie. [**"Fresh" Placenta in Surgery**] *Méd. Trop.* Marseilles. 1958, Jan.–Feb., v. 18, No. 1, 84–97, 11 figs.

ii. Guiraud, R. Thérapie placentaire et affections tropicales. [**Placental Therapy in Tropical Conditions**] *Méd. Trop.* Marseilles. 1958, Jan.–Feb., v. 18, No. 1, 98–100.

i. The idea of utilizing placental tissue as a dressing has been known to the Chinese for 5,000 years. Filatov in 1933, and subsequently other Russian and French authorities, have used placenta for tissue transplantation. It has also found a place in ophthalmology and dermatology. In 1941 Imbert in Marseilles reported remarkable success in the healing of intestinal fistulae.

In 1951 the authors began to practice this method in their surgical work in Saigon, at first as implants on cutaneous surfaces and later as plugs for traumatic cavities. It is not correct to refer to a placental implant as a graft, for the placental tissue is "accepted" and tolerated on the surface of the wound and finally incorporated by the tissues, and in reality it assumes the role of a homo-transplant. The placenta exerts its influence on a wounded surface by what are termed biostimuli as well as by its histological structure. The placenta itself should emanate from a healthy woman free from syphilis. Great care should be taken to collect it in an aseptic manner with membranes and cord intact. It should then be placed in a refrigerator at a temperature of +4°C. In tropical countries

it must be prepared for use as quickly as possible. It must be freed of the membranes, the umbilical cord and blood clots. Then it should be chopped into cubes each of 1·5 cm. in size. These are immersed in physiological saline in a sterile flask with a hermetically sealing cap. The preparation must be sterilized by the addition of 1 million units of penicillin. The placental cubes, thus prepared, can be used up to the eighth or twelfth days, but usually about the sixth.

It is inadvisable to use the absolutely "fresh" placenta: indeed it is essential that it should be subjected to a process of seasoning so as to permit the formation of biostimuli.

Placental cubes can be used for subcutaneous implantation, as biological dressings, as mass implants with cutaneous sutures and to plug up cavities. It may be necessary to repeat the implantation 2 or 3 times. One of the drawbacks to this technique is the disagreeable smell, but the results achieved largely compensate for this inconvenience.

It is claimed that this method is specially suitable for indolent wounds, such as those produced by direct trauma and especially for chronic cavities and sinuses resulting from osteomyelitis. [On these premises it might prove suitable for treatment of chronic tropical ulcers.]

Philip Manson-Bahr

ii. The author applied "placental cubes" to the cavities in 35 cases of yaws osteitis, with discharging fistulae, seen in Togo between 1954 and 1955. As diagnosis was made largely on clinical grounds, it is admitted that some of them may have been cases of osteomyelitis of bacterial or fungal origin. In addition to the placental treatment, curettage and immobilization, each patient received a single injection of 600,000 units of penicillin.

In over half the patients the treatment was successful and the cavities filled up by the 20th day. In many of these cicatrization was encouraged by means of skin grafts. In 15 patients results were less successful, as some residual suppuration remained. In 7 the treatment was ineffective: this was attributed either to technical faults or to intolerance of the tissues to placental material.

The author considers that the results are encouraging, but suggests an associated dose of 1·2 mega units of penicillin, rather than 600,000.

H. J. O'D. Burke-Gaffney

Pires, F. M. & Gouveia, E. R. Citorráquia e albuminorráquia no indígena normal da Guiné Portuguesa. [**Cells and Protein in the Cerebrospinal Fluid of Normal Inhabitants of Portuguese Guinea**] *Anais Inst. Med. Trop.* Lisbon. 1957, Mar.–June, v. 14, Nos. 1/2, 111–36. [19 refs.] English summary (9 lines).

Nauck, E. G. Die Entwicklung der Tropenmedizin in den letzten 100 Jahren. [**The Development of Tropical Medicine in the Last 100 Years**] Reprinted from *Münch. Med. Woch.* 1958, v. 100, No. 1, 51–4.

REPORTS AND SURVEYS

Coonoor. Pasteur Institute of Southern India. Coonoor. [Veeraraghavan, N., Director] **Golden Jubilee Souvenir, 1907–1957.** 150 pp., numerous illustrations. [Numerous refs.] 1957. Madras: Diocesan Press, India.

Pasteur Institutes in many parts of the world have done necessary and most notable work in the study of infective diseases, and it is fitting that from time to time they should hark back to beginnings which were often quite modest, and pay tribute to the past members of their staffs who developed them. The Pasteur Institute of Southern India, Coonoor, started to function on 6 April 1907, and the present volume was issued in 1957 to celebrate the Golden Jubilee. The Director, Dr. N. Veeraraghavan, and his staff are to be congratulated on producing a volume which brings together a large mass of information of great historical and scientific value. The scientific advances made in that period have already been incorporated into the background of medical knowledge, but without a publication such as this much of the history might have been lost.

The first section contains a comprehensive list of present members of the staff. The second, occupying 14 pages, covers briefly the work undertaken in the 50 years, and is illustrated with group photographs of the staffs in various years; there are lists of the various officers of the Institute from 1907 onwards, and one may mention especially the Directors:—J. W. Cornwall, T. H. Gloster, K. R. K. Iyengar, H. W. Mulligan, M. L. Ahuja and the present Director, N. Veeraraghavan.

Section 3, of 51 pages, traces the history of scientific contributions made by the Institute. Rabies is naturally a prominent subject, and the essay on it is itself an informative monograph. The extent of the problem is shown by the fact that in Madras State there were 21,198 deaths from rabies in the period 1913–56. Other items in this section relate to influenza, Q fever, cholera, typhoid fever, malaria, leishmaniasis and other subjects, and at the end of the section there is a list of 109 papers contributed to journals (with a few exceptions Indian journals) on these various subjects.

The fourth section is a short essay on general trends for the future, and

the fifth is a scientific report for the year 1956, dealing extensively with rabies and briefly with a few other subjects.

This is a record of work of which all who have assisted it may be proud. *Charles Wilcocks*

East Africa High Commission. **East African Virus Research Institute, Entebbe. Report No. 7, 1956–57** [Lumsden, W. H. R., Acting Director]. 61 pp., 5 figs. 1957. Nairobi: Govt. Printer. [Sh. 5.]

Among studies undertaken at the Institute in 1956–57 was an investigation of the susceptibility of the wild rat *Arvicanthis abyssinicus nubilans* to Rift Valley Fever (RVF) virus. RVF virus circulated in these rats after intraperitoneal inoculation, neutralizing antibodies developing when doses of $10^{2 \cdot 6}$ mouse LD50 or more were given. Most inoculated rats remained healthy, but a few which died had titres of virus as high as 10^{8} mouse LD50 per ml. in their peripheral blood. It is considered that *A. a. nubilans* may be a natural host of RVF virus in Abyssinia, East Africa and the Belgian Congo.

Experiments with Semliki Forest virus in mice inoculated by different routes suggested that virus multiplied in at least 2 separate sites, one outside and one inside the central nervous system. The blood-brain barrier in adult mice is apparently rarely crossed by virus particles, but virus passes into the brain of 5-day-old mice fairly rapidly after intraperitoneal inoculation.

Mice under 5 days old showed lesions in the skeletal muscles and myocardium when infected with Zika virus. These lesions occurred after infection with a recently-isolated strain and with 140th adult mouse passage virus. Two new strains of Zika virus were isolated from *Aëdes africanus* collected on the Entebbe peninsula.

Analysis of the results of the 1950–52 yellow fever immunity survey of Northern Rhodesia was begun. The results obtained with 2,891 sera from the Balovale, Kalabo, Mongu and Senanga districts indicated that both sexes were exposed to infection, the incidence of positive tests for both males and females being 8% and 12% in the 5–14-year and 15–24-year age-groups respectively. After the age of 24 years the incidence of positive tests remained at about 12% in females but rose to around 20% in males.

A sample of sera from galagos collected in an area of Northern Rhodesia where human immunity was rare or absent gave positive tests in 3 out of 15 *Galago crassicaudatus* and 5 out of 13 *G. senegalensis*; it seems that neutralizing antibodies to yellow fever virus may occur among galagos in parts of Northern Rhodesia, Kenya and Uganda where they are not found in man. Sera from 3 out of 10 specimens of *Cercopithecus neglectus* collected in Uganda (near Tororo) gave positive protection tests, and subsequent work showed that *C. neglectus* is able to circulate virus without signs of illness.

In the course of other virological investigations rabies virus was isolated from 2 dogs in the Entebbe area. A filterable agent which was pathogenic for mice was recovered from the submaxillary glands of a freetail bat (*Tadarida* (*Chaerephon*) *hindei*) collected at Entebbe. Work on 2 infective agents isolated from patients suffering from febrile conditions in the Belgian Congo is in progress.

Entomological studies included interesting observations on the oviposition cycle in *Aëdes aegypti* and *A. africanus*, which indicate that a light-activated hormone mechanism may be involved. A similar mechanism may also operate in the case of *Taeniorhynchus fuscopennatus*. It is suggested that blood-feeding may directly or indirectly be dependent on release of a hormone of this kind.

The report gives short descriptions of other work, which included unsuccessful attempts to recover viruses from patients with acute febrile conditions, virological studies in birds, and the development of a baited insect trap.

[For review of 1955–1956 Report, see this *Bulletin*, 1957, v. 54, 769.]

R. S. F. Hennessey

Fraga de Azevedo, J. Relatório sobre as actividades do Instituto de Medicina Tropical em 1956. [**Report of the Institute of Tropical Medicine, Lisbon, for 1956**] *Anais Inst. Med. Trop.* Lisbon. 1957, Mar.–June, v. 14, Nos. 1/2, 249–312.

Soeiro, A. N. Relatório das actividades do Instituto de Investigação Médica de Moçambique em 1956 e plano de trabalhos para 1957. [**Report of the Institute of Medical Investigation at Mozambique for 1956 and Programme for 1957**] *Anais Inst. Med. Trop.* Lisbon. 1957, Mar.–June, v. 14, Nos. 1/2, 313–33.

de Meira, M. T. V. Relatório anual da Missão Permanente de Estudo e Combate de Endemias de Cabo Verde (1956). [**Annual Report of the Mission for the Study and Control of Endemic Diseases at Cape Verde, 1956**] *Anais Inst. Med. Trop.* Lisbon. 1957, Mar.–June, v. 14, Nos. 1/2, 335–73, 15 figs. on 8 pls.

Gratama, S. **A Survey of 1,000 Patients treated in the Firestone Hospital, Cavalla Plantation, Liberia, between February 1, 1955, and February 15, 1956.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1957, Sept., v. 9, No. 3, 237–44.

The Cavalla rubber plantation lies in the south-east corner of Liberia, where the climate is warm and humid, average annual rainfall being

104·34 inches. African employees and their families total about 7,000 persons, but the hospital also admits numerous outsiders. The general state of health of the plantation population compared with Liberia as a whole is favourable, though diet is defective, specially in animal protein.

Of the patients whose conditions are analysed, 50·5% were males, 37·5% females and 12% children under 10. 46·4% were surgical, 20·9% internal, 17·2% obstetric, 3·5% gynaecological and 12% paediatric. Of surgical cases 35% had inguinal hernia. Hydrocele, tropical ulcer, cellulitis and complications of gonorrhoea were common. Elephantiasis, malignant tumours and appendicitis occurred rarely. Peptic ulcers, gall-stones and stones of the urinary tract were very rare or never diagnosed. Microfilariae were found regularly in hydrocele fluid.

Cardiovascular conditions were the most frequent internal diagnoses. More than 7% of adult patients had high blood pressure, apparently seldom due to renal causes. The absence of thrombosis and coronary disease was considered remarkable; a few blood examinations gave the impression that the cholesterol level was generally low, probably owing to the high unsaturated fatty acid content of palm and peanut oil, almost the only sources of fat. Pulmonary and glandular tuberculosis, and pneumonia, were common. Infectious hepatitis occurred regularly. Diabetes occurred sporadically and epilepsy was fairly common. 13% of adults and 30% of children had haemoglobin levels under 10 gm.%. Cerebral malaria was not uncommon in children; enlarged spleens were found in 39% of adults and 27% of children, and enlarged livers in 16% of adults and 16% of children. Schistosomiasis and trypanosomiasis were rare and yaws appeared to be well under control. Filariasis and onchocerciasis were common. Filariasis was considered to be the sole cause of very stubborn haematuria in at least 4 cases. Otitis media was frequent, and the common cold a great nuisance. Not a single case of sickle-cell trait was diagnosed.

Detailed tables of diagnoses and causes of death are given. [With a few exceptions the experience seems to have been typical for West African hospital practice.] *B. B. Waddy*

BOOK REVIEWS

VANBREUSEGHEM, R. [M.D.] **Mycoses of Man and Animals.** Authorized English Translation by J. WILKINSON, Ph.D., F.L.S. pp. xi + 235, 48 figs. 1958. London: Sir Isaac Pitman & Sons. Ltd., Parker Street, Kingsway, W.C.2. [50s.]

The second edition of Langeron's *Précis de Mycologie* was completed after his death by Vanbreuseghem, who contributed to it the final section,

on the mycoses of man and animals; the complete book was reviewed in this *Bulletin*, 1953, v. 50, 359.

Vanbreuseghem's section has now been translated into English, and the translation has been made as literal as possible, and there has been no addition to or alteration of the original text. The English reads well and Dr. Wilkinson may be congratulated on producing an attractive version, which should appeal to workers who wish to have the benefit of the experience and views of the author in an easily accessible form. The section is divided into 17 chapters covering the actinomycoses, aspergilloses, blastomycoses and chromoblastomycoses, cephalosporioses, coccidioidomycosis, dermatomycoses, haplomycosis, histoplasmosis, the levuroses, mycetomas, piedras, pityriasis versicolor, rhinosporidiosis and sporotrichosis. There are many line drawings and half-tone plates, some of them very good.

The original French text was written for the 1952 edition, and there have been no additions to this; readers will therefore not expect the most recent work to be included. *Charles Wilcocks*

IMMS, A. D. **A General Textbook of Entomology including the Anatomy, Physiology, Development and Classification of Insects.** 9th Edition entirely revised by O. W. RICHARDS, M.A., D.Sc. & R. G. DAVIES, M.Sc. pp. x + 886, 609 figs. 1957. London: Methuen & Co. Ltd., 36, Essex Street, Strand, W.C.2. [75s.]

The previous edition of this classical text-book was published in 1951. Except for the third edition of 1934, there has been little change since the original publication of the book in 1925. The present edition is revised to bring the book up-to-date with the literature to 1952, with some inclusion of information of later date. Although the arrangement of the book is similar to earlier editions, physiology has been extensively revised, references checked and grouped at the ends of chapters in an accepted system (with titles of papers), and about 50 new figures are included. It is a little bulkier than formerly. The revising authors, Professor O. W. Richards and Mr. R. G. Davies of Imperial College, London, have made a very substantial improvement in this text-book, which, without their efforts, would surely have soon lost much of its value and use as a standard work in general entomology. *D. S. Bertram*

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